Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts

January 28, 2016

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

Re: **Notice of Exempt Modification – Facility Modification**
201 South Main Street, Newtown, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 127-foot level of the existing 150-foot tower at 201 South Main Street in Newtown, Connecticut (the "Property"). The tower is owned by Crown Castle. The Council approved Cellco's use of the existing tower in 2002. Cellco now intends to modify its facility by replacing six (6) existing antennas with three (3) model SBNHH-1D65B, 700 MHz antennas and three (3) model SBNHH-1D65B, 1900 MHz antennas; and adding three (3) model SBNHH-1D65B, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 127-foot level on the tower. Cellco also intends to install nine (9) remote radio heads ("RRHs") behind its antennas and one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco's additional 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 E. Patricia Llodra, First Selectwoman for the Town of Newtown. A copy of this letter is also being sent to Bluelinx Corp., the owner of the Property and Crown, the tower owner.

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. The new and replacement antennas and RRHs will be located at the 127-foot level on the 150-foot tower.

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

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

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative worst-case RF emissions calculation for Cellco's modified facility is included in 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).

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:
E. Patricia Llodra, Newtown First Selectwoman
Bluelinx Corp.
Crown
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

Andrew® Tri-band Antenna, 698–896 and 2x 1695–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
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	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
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	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol® | Teletilt®
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Performance Note	Outdoor usage

Product Specifications

SBNHH-1D65B

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	180.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
RET System	Teletilt®

Packed Dimensions

Depth	299.0 mm | 11.8 in
Length	1970.0 mm | 77.6 in
Width	409.0 mm | 16.1 in
Shipping Weight	31.0 kg | 68.3 lb

Regulatory Compliance/Certifications

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

Included Products

Product Specifications

SBNHH-1D65B

BSAMNT-1 — 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

ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

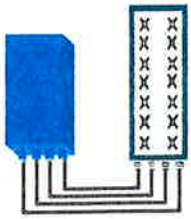
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

Alcatel·Lucent

TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

PCS RF MODULES
RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

	RRH2x60
RF Output Power	2x60W
Instantaneous Bandwidth	20MHz
Transmitter	2 TX
Receiver 1900 HW version 1900A HW version	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features	AISG 2.0 for RET/TMA
	Internal Smart Bias-T
Power	-48VDC
CPRI Ports	2 CPRI Rate 3 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (top mounted)

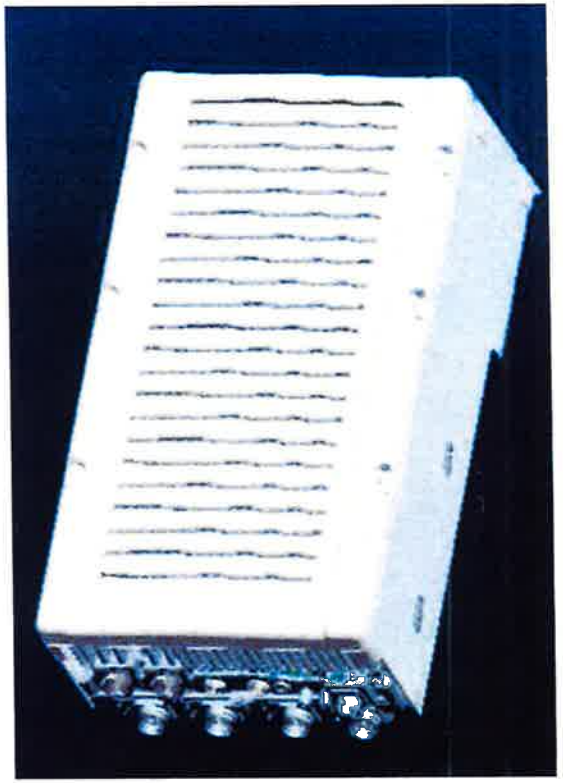
** Not a Verizon Wireless deployed product

Alcatel-Lucent

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w)x 9.4" (d)**
Weight	55lb**



**- Includes solar shield but not mounting brackets (8 lbs.)

Alcatel·Lucent

B66A RRH 4X45 - PHYSICAL CHARACTERISTICS- TARGET 15.1

B4 RRH4x45-4R (AWS-Extension Band)	
Frequency Band	LR15.1 – B4 / LR16.1 B66 (AWS 1 and 3 only)
RF Output Power	2x90W/4x45W (SW configurable)
Operational range	2110-2180 MHz, DL/ 1710-1780 MHz UL
Instantaneous Bandwidth	70MHz
Configuration (HW readiness)	LTE: 2T2R, 2T4R, 4T4R
Carrier Bandwidths	5, 10, 15 and 20 MHz
Interfaces	2x CPRI Rate 7 Ports Antenna Connectors 4.3-10
AISG Support	AISG 2.0 for RET Internal Smart Bias T
Monitor Ports	NA (Spec An to replace ports)
Environmental	GR487 Compliance / GR3178 Compliance (with exceptions)
Mounting options	Pole/Wall
Connectors location	All bottom
External Alarms	4
Annual Return Rate (Target)	<2%
Operating Temperature	-40 C to +55 C (without solar load)

- Commercial Product Will include B66 support of AWS 1 and 3.
- Lower AWS 3 UL Not in 3GPP Band 66 Definition

Physical Dimensions – Not to Exceed		
	W/O Solar Shield	With Solar Shield
Dimensions HxWxD	H = 26in (H=660mm) W = 11.4in (W=290mm) D = 5.9in (D=150mm)	H = 26.6in (H=675mm) W = 12in (W=304mm) D = 6.8n (D=173mm)
Volume	29l	35.5l
Weight		64lbs / 29kg

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
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)
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)
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
Size (Power)		[mm (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm (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-99-689 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

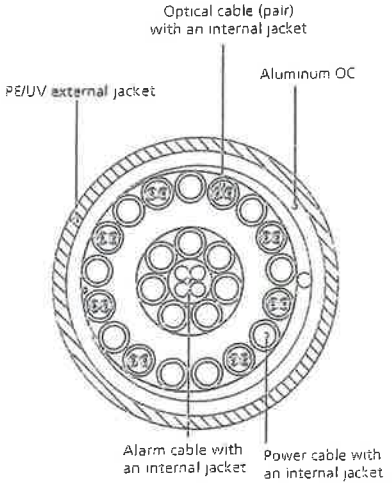


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Newtown S								
Tower Height: 150ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	1	500	110	0.0166	880	0.5867	0.28%	
*AT&T UMTS	1	500	110	0.0166	1900	1.0000	0.17%	
*AT&T GSM	6	427	110	0.0852	1900	1.0000	0.85%	
*AT&T LTE	1	500	110	0.0166	740	0.4933	0.34%	
*T-Mobile	1	445	148	0.0079	700	0.4667	0.17%	
*T-Mobile	2	953	148	0.0340	1900	1.0000	0.34%	
*T-Mobile	4	477	148	0.0340	2100	1.0000	0.34%	
*Sprint	2	693	137	0.0290	1900	1.0000	0.29%	
*Sprint	1	390	137	0.0082	850	0.5667	0.14%	
*Sprint	2	693	137	0.0290	2500	1.0000	0.29%	
Verizon	**1**	**2285**	**127**	**0.0509**	**1970**	**1.0000**	**5.09%**	
Verizon	**9**	**296**	**127**	**0.0594**	**869**	**0.5793**	**10.25%**	
Verizon	**1**	**2743**	**127**	**0.0612**	**2145**	**1.0000**	**6.12%**	
Verizon	**1**	**751**	**127**	**0.0167**	**746**	**0.4973**	**3.37%**	
								28.04%
* Source: Siting Council								

ATTACHMENT 3

PJF PAUL J. FORD & COMPANY

Date: **November 19, 2015**

Timothy Howell
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
980.209.8242

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

Subject: **Structural Modification Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Newtown South CT
Crown Castle Designation:	**Crown Castle BU Number:**	826222
	Crown Castle Site Name:	Newtown/RT-25
	Crown Castle JDE Job Number:	347119
	Crown Castle Work Order Number:	1151907
	Crown Castle Application Number:	310988 Rev. 0
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37515-3231.001.7700
Site Data:	**201 South Main Street, Newtown, Fairfield County, CT**	
	Latitude *41° 22' 41.32"*, Longitude *-73° 16' 26.94"*	
	150 Foot - Monopole Tower	

Dear Timothy Howell,

Paul J Ford and Company is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 844845, in accordance with application 310988, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC4.5: Modified Structure w/ Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

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

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

Respectfully submitted by:

Bob Koors, E.I.
Structural Designer

tnxTower Report - version 6.1.4.1

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

1-20-15

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA
Table 1 - Proposed Antenna and Cable Information
Table 2 - Existing Antenna and Cable Information

3) ANALYSIS PROCEDURE
Table 3 - Documents Provided
3.1) Analysis Method
3.2) Assumptions

4) ANALYSIS RESULTS
Table 4 - Section Capacity (Summary)
Table 5 – Tower Components vs. Capacity
4.1) Recommendations

5) APPENDIX A
tnxTower Output

6) APPENDIX B
Base Level Drawing

7) APPENDIX C
Additional Calculations

1) INTRODUCTION

This tower is a 150 ft Monopole tower designed by PIROD MANUFACTURES INC. in October of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
127.0	127.0	3	alcatel lucent	RRH2X60-PCS	1	1-5/8	-
		3	alcatel lucent	RRH2x60-700			
		3	alcatel lucent	RRH4X45-AWS4 B66			
		9	commscope	SBNHH-1D65B w/ Mount Pipe			
		1	rfs celwave	DB-B1-6C-8AB-0Z			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

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
148.0	148.0	3	commscope	LNX-6515DS-VTM w/ Mount Pipe	11 1	1-5/8 1-1/4	1
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RRUS 11 B12			
		1	tower mounts	Sector Mount [SM 410-3]			
138.0	137.0	3	alcatel lucent	1900MHz RRH	3	1-1/4	1
		3	alcatel lucent	800MHZ RRH			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
	138.0	1	tower mounts	Platform Mount [LP 601-1]			
127.0	127.0	3	swedcom	SLCP 2x6014 w/ Mount Pipe	5	1-5/8	2
		1	antel	BXA-171063-12BF w/ Mount Pipe			
		2	antel	BXA-171063/8CF w/ Mount Pipe			
		6	rfs celwave	APL866513-42T0 w/ Mount Pipe	7	1-5/8	1
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 304-1]			
110.0	110.0	6	ericsson	RRUS-11	1 2 6 1	3/8 7/8 1-1/4 3/4	1
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		3	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 304-1]			

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

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 1305751600, 08/15/2013	3536527	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Pirod, A-117711-F-1001206, 10/17/2000	3536528	CCISITES
4-POST-MODIFICATION INSPECTION	SGS, 130625, 6/30/2014	5156735	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Monopole was fabricated and installed in accordance with the manufacturer's specifications.
2) Monopole has been properly maintained in accordance with manufacturer's specifications.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Monopole was reinforced in conformance with the referenced modification drawings.
5) Monopole will be reinforced in conformance with the attached proposed modification drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	150 - 133	Pole	TP26x21.83x0.25	1	-4.25	1032.68	14.4	Pass
L2	133 - 98.42	Pole	TP34.0625x24.7837x0.3125	2	-12.60	1691.44	59.1	Pass
L3	98.42 - 64.75	Pole	TP41.75x32.4898x0.375	3	-19.04	2488.83	73.5	Pass
L4	64.75 - 31.92	Pole	TP49.0625x39.8468x0.375	4	-26.79	2929.03	85.2	Pass
L5	31.92 - 0	Pole	TP56.125x46.9609x0.375	5	-37.32	3449.67	91.4	Pass
							Summary	
						Pole (L5)	91.4	Pass
						RATING =	91.4	Pass

Table 5 - Tower Component Stresses vs. Capacity - LC4.5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	91.3	Pass
1	Base Plate	0	61.4	Pass
1	Base Foundation Steel	0	86.6	Pass
1	Base Foundation Soil Interaction	0	75.5	Pass
Structure Rating (max from all components) =				**91.4%**

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

4.1) Recommendations

Reinforce monopole in conformance with the attached modification drawings.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Fairfield County, Connecticut.
2) Basic wind speed of 85 mph.
3) Nominal ice thickness of 0.7500 in.
4) Ice thickness is considered to increase with height.
5) Ice density of 56.00 pcf.
6) A wind speed of 38 mph is used in combination with ice.
7) Deflections calculated using a wind speed of 50 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
√ Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	**Poles**
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice Capacity Exemption	

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	150.0000-133.0000	17.0000	2.92	18	21.8300	26.0000	0.2500	1.0000	A572-65 (65 ksi)
L2	133.0000-98.4200	37.5000	3.83	18	24.7837	34.0625	0.3125	1.2500	A572-65 (65 ksi)
L3	98.4200-64.7500	37.5000	4.67	18	32.4898	41.7500	0.3750	1.5000	A572-65 (65 ksi)
L4	64.7500-31.9200	37.5000	5.50	18	39.8468	49.0625	0.3750	1.5000	A572-65 (65 ksi)
L5	31.9200-0.0000	37.4200		18	46.9609	56.1250	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.1668	17.1237	1007.4853	7.6609	11.0896	90.8492	2016.2962	8.5635	3.4021	13.608
	26.4011	20.4326	1711.6544	9.1412	13.2080	129.5922	3425.5610	10.2183	4.1360	16.544
L2	25.8997	24.2724	1836.3792	8.6873	12.5901	145.8585	3675.1749	12.1385	3.8119	12.198
	34.5880	33.4758	4817.4335	11.9812	17.3038	278.4040	9641.2058	16.7411	5.4450	17.424
L3	33.9514	38.2247	4980.7241	11.4008	16.5048	301.7737	9968.0019	19.1160	5.0582	13.489
	42.3941	49.2466	10650.9822	14.6881	21.2090	502.1916	21315.9793	24.6280	6.6880	17.835
L4	41.6269	46.9813	9247.7575	14.0125	20.2422	456.8559	18507.6835	23.4951	6.3530	16.941
	49.8194	57.9503	17355.1378	17.2841	24.9238	696.3293	34733.1119	28.9807	7.9750	21.267
L5	49.0530	55.4488	15203.3083	16.5380	23.8561	637.2918	30426.6216	27.7297	7.6051	20.28
	56.9908	66.3564	26056.1506	19.7913	28.5115	913.8821	52146.5865	33.1845	9.2180	24.581

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 150.0000-133.0000				1	1	1		
L2 133.0000-98.4200				1	1	1		
L3 98.4200-64.7500				1	1	1		
L4 64.7500-31.9200				1	1	1		
L5 31.9200-0.0000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8)	C	No	Inside Pole	148.0000 - 0.0000	11	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
MLE Hybrid 3Power/6Fiber RL 2(1 1/4")	C	No	Inside Pole	148.0000 - 0.0000	1	No Ice	0.0000	0.68
						1/2" Ice	0.0000	0.68
						1" Ice	0.0000	0.68
						2" Ice	0.0000	0.68
						4" Ice	0.0000	0.68
**								
HB114-1-0813U4-M5J(1 1/4")	C	No	Inside Pole	138.0000 - 0.0000	3	No Ice	0.0000	1.20
						1/2" Ice	0.0000	1.20
						1" Ice	0.0000	1.20
						2" Ice	0.0000	1.20
						4" Ice	0.0000	1.20
**								
LDF7-50A(1-5/8)	C	No	CaAa (Out Of	127.0000 - 0.0000	2	No Ice	0.1980	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
			Face)			1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
						2" Ice	0.5980	10.55
						4" Ice	0.9980	30.04
LDF7-50A(1-5/8)	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	5	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.55
						4" Ice	0.0000	30.04
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	1	No Ice	0.0000	1.30
						1/2" Ice	0.0000	2.81
						1" Ice	0.0000	4.94
						2" Ice	0.0000	11.02
						4" Ice	0.0000	30.52
**								
LDF2-50A(3/8)	C	No	Inside Pole	110.0000 - 0.0000	1	No Ice	0.0000	0.08
						1/2" Ice	0.0000	0.08
						1" Ice	0.0000	0.08
						2" Ice	0.0000	0.08
						4" Ice	0.0000	0.08
LDF5-50A(7/8)	C	No	Inside Pole	110.0000 - 0.0000	2	No Ice	0.0000	0.33
						1/2" Ice	0.0000	0.33
						1" Ice	0.0000	0.33
						2" Ice	0.0000	0.33
						4" Ice	0.0000	0.33
LDF6-50A(1-1/4)	C	No	Inside Pole	110.0000 - 0.0000	6	No Ice	0.0000	0.60
						1/2" Ice	0.0000	0.60
						1" Ice	0.0000	0.60
						2" Ice	0.0000	0.60
						4" Ice	0.0000	0.60
9776(3/4")	C	No	Inside Pole	110.0000 - 0.0000	1	No Ice	0.0000	0.31
						1/2" Ice	0.0000	0.31
						1" Ice	0.0000	0.31
						2" Ice	0.0000	0.31
						4" Ice	0.0000	0.31
2" (Nominal) Conduit	C	No	Inside Pole	110.0000 - 0.0000	1	No Ice	0.0000	0.72
						1/2" Ice	0.0000	0.72
						1" Ice	0.0000	0.72
						2" Ice	0.0000	0.72
						4" Ice	0.0000	0.72
**								

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	150.0000-133.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.16
L2	133.0000-98.4200	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.318	0.72
L3	98.4200-64.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	13.333	0.87
L4	64.7500-31.9200	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	13.001	0.84
L5	31.9200-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	12.640	0.82

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	150.0000-133.0000	A	0.893	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	0.16
L2	133.0000-98.4200	A	0.871	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	21.526	1.45
L3	98.4200-64.7500	A	0.836	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	25.068	1.70
L4	64.7500-31.9200	A	0.785	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	23.974	1.62
L5	31.9200-0.0000	A	0.750	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	22.663	1.52

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.0000-133.0000	0.0000	0.0000	0.0000	0.0000
L2	133.0000-98.4200	-0.3850	0.2223	-0.6323	0.3651
L3	98.4200-64.7500	-0.4567	0.2637	-0.7532	0.4349
L4	64.7500-31.9200	-0.4653	0.2686	-0.7701	0.4446
L5	31.9200-0.0000	-0.4715	0.2722	-0.7729	0.4463

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / °	Azimuth Adjustment	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.8253 7.3471 7.8631 8.9261 11.1755	5.6424 6.4800 7.2567 8.8640 12.2932	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.8253 7.3471 7.8631 8.9261 11.1755	5.6424 6.4800 7.2567 8.8640 12.2932	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.8253 7.3471 7.8631 8.9261 11.1755	5.6424 6.4800 7.2567 8.8640 12.2932	0.11 0.17 0.23 0.38 0.81
LNX-6515DS-VTM w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice 1/2" Ice 1" Ice 2" Ice	11.6828 12.4043 13.1351 14.6007 17.8748	9.8418 11.3657 12.9138 15.2672 20.1392	0.08 0.17 0.27 0.51 1.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
LNX-6515DS-VTM w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	11.6828	9.8418	0.08
						1/2" Ice	12.4043	11.3657	0.17
						1" Ice	13.1351	12.9138	0.27
						2" Ice	14.6007	15.2672	0.51
						4" Ice	17.8748	20.1392	1.15
LNX-6515DS-VTM w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	11.6828	9.8418	0.08
						1/2" Ice	12.4043	11.3657	0.17
						1" Ice	13.1351	12.9138	0.27
						2" Ice	14.6007	15.2672	0.51
						4" Ice	17.8748	20.1392	1.15
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	6.8155	5.6334	0.11
						1/2" Ice	7.3373	6.4717	0.17
						1" Ice	7.8532	7.2478	0.23
						2" Ice	8.9160	8.8537	0.38
						4" Ice	11.1650	12.2804	0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	6.8155	5.6334	0.11
						1/2" Ice	7.3373	6.4717	0.17
						1" Ice	7.8532	7.2478	0.23
						2" Ice	8.9160	8.8537	0.38
						4" Ice	11.1650	12.2804	0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	6.8155	5.6334	0.11
						1/2" Ice	7.3373	6.4717	0.17
						1" Ice	7.8532	7.2478	0.23
						2" Ice	8.9160	8.8537	0.38
						4" Ice	11.1650	12.2804	0.81
KRY 112 144/1	A	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						1" Ice	0.5941	0.3511	0.02
						2" Ice	0.8145	0.5326	0.03
						4" Ice	1.3590	0.9992	0.08
KRY 112 144/1	B	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						1" Ice	0.5941	0.3511	0.02
						2" Ice	0.8145	0.5326	0.03
						4" Ice	1.3590	0.9992	0.08
KRY 112 144/1	C	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						1" Ice	0.5941	0.3511	0.02
						2" Ice	0.8145	0.5326	0.03
						4" Ice	1.3590	0.9992	0.08
RRUS 11 B12	A	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	3.3056	1.3611	0.05
						1/2" Ice	3.5497	1.5404	0.07
						1" Ice	3.8025	1.7284	0.10
						2" Ice	4.3340	2.1302	0.15
						4" Ice	5.5006	3.0377	0.31
RRUS 11 B12	B	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	3.3056	1.3611	0.05
						1/2" Ice	3.5497	1.5404	0.07
						1" Ice	3.8025	1.7284	0.10
						2" Ice	4.3340	2.1302	0.15
						4" Ice	5.5006	3.0377	0.31
RRUS 11 B12	C	From Face	4.0000 0.00 0.00	0.00	148.0000	No Ice	3.3056	1.3611	0.05
						1/2" Ice	3.5497	1.5404	0.07
						1" Ice	3.8025	1.7284	0.10
						2" Ice	4.3340	2.1302	0.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
								2" Ice	5.5006	3.0377	0.31
								4" Ice			
Sector Mount [SM 410-3]	C	None				0.00	148.0000	No Ice	23.9600	23.9600	1.10
								1/2" Ice	34.0600	34.0600	1.60
								1" Ice	44.1600	44.1600	2.10
								2" Ice	64.3600	64.3600	3.10
								4" Ice	104.7600	104.7600	5.09
***											
APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.0000	0.00	-1.00	0.00	138.0000	No Ice	8.4975	6.9458	0.08
								1/2" Ice	9.1490	8.1266	0.15
								1" Ice	9.7672	9.0212	0.23
								2" Ice	11.0311	10.8440	0.41
								4" Ice	13.6786	14.8507	0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Face	4.0000	0.00	-1.00	0.00	138.0000	No Ice	8.4975	6.9458	0.08
								1/2" Ice	9.1490	8.1266	0.15
								1" Ice	9.7672	9.0212	0.23
								2" Ice	11.0311	10.8440	0.41
								4" Ice	13.6786	14.8507	0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.0000	0.00	-1.00	0.00	138.0000	No Ice	8.4975	6.9458	0.08
								1/2" Ice	9.1490	8.1266	0.15
								1" Ice	9.7672	9.0212	0.23
								2" Ice	11.0311	10.8440	0.41
								4" Ice	13.6786	14.8507	0.91
800MHZ RRH	A	From Face	4.0000	0.00	-1.00	0.00	138.0000	No Ice	2.4899	2.0685	0.05
								1/2" Ice	2.7061	2.2705	0.07
								1" Ice	2.9310	2.4812	0.10
								2" Ice	3.4068	2.9284	0.16
								4" Ice	4.4620	3.9265	0.32
800MHZ RRH	B	From Face	4.0000	0.00	-1.00	0.00	138.0000	No Ice	2.4899	2.0685	0.05
								1/2" Ice	2.7061	2.2705	0.07
								1" Ice	2.9310	2.4812	0.10
								2" Ice	3.4068	2.9284	0.16
								4" Ice	4.4620	3.9265	0.32
800MHZ RRH	C	From Face	4.0000	0.00	-1.00	0.00	138.0000	No Ice	2.4899	2.0685	0.05
								1/2" Ice	2.7061	2.2705	0.07
								1" Ice	2.9310	2.4812	0.10
								2" Ice	3.4068	2.9284	0.16
								4" Ice	4.4620	3.9265	0.32
1900MHz RRH	A	From Face	4.0000	0.00	-1.00	0.00	138.0000	No Ice	2.9069	3.8014	0.04
								1/2" Ice	3.1446	4.0650	0.08
								1" Ice	3.3909	4.3372	0.11
								2" Ice	3.9094	4.9076	0.19
								4" Ice	5.0502	6.1520	0.41
1900MHz RRH	B	From Face	4.0000	0.00	-1.00	0.00	138.0000	No Ice	2.9069	3.8014	0.04
								1/2" Ice	3.1446	4.0650	0.08
								1" Ice	3.3909	4.3372	0.11
								2" Ice	3.9094	4.9076	0.19
								4" Ice	5.0502	6.1520	0.41
1900MHz RRH	C	From Face	4.0000	0.00	-1.00	0.00	138.0000	No Ice	2.9069	3.8014	0.04
								1/2" Ice	3.1446	4.0650	0.08
								1" Ice	3.3909	4.3372	0.11
								2" Ice	3.9094	4.9076	0.19
								4" Ice	5.0502	6.1520	0.41
Platform Mount [LP 601-1]	C	None				0.00	138.0000	No Ice	28.4700	28.4700	1.12
								1/2"	33.5900	33.5900	1.51

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						Ice	38.7100	38.7100	1.91
						1" Ice	48.9500	48.9500	2.69
						2" Ice	69.4300	69.4300	4.26
						4" Ice			
(3) 2.375" OD x 6' Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	138.0000	No Ice	1.4250	1.4250	0.03
						1/2" Ice	1.9250	1.9250	0.04
						1" Ice	2.2939	2.2939	0.05
						2" Ice	3.0596	3.0596	0.09
						4" Ice	4.7022	4.7022	0.23
(3) 2.375" OD x 6' Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	138.0000	No Ice	1.4250	1.4250	0.03
						1/2" Ice	1.9250	1.9250	0.04
						1" Ice	2.2939	2.2939	0.05
						2" Ice	3.0596	3.0596	0.09
						4" Ice	4.7022	4.7022	0.23
(3) 2.375" OD x 6' Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	138.0000	No Ice	1.4250	1.4250	0.03
						1/2" Ice	1.9250	1.9250	0.04
						1" Ice	2.2939	2.2939	0.05
						2" Ice	3.0596	3.0596	0.09
						4" Ice	4.7022	4.7022	0.23
****									
(2) APL866513-42T0 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice	4.5308	4.9208	0.03
						1/2" Ice	4.9675	5.5962	0.08
						1" Ice	5.4135	6.2837	0.13
						2" Ice	6.3370	7.7123	0.25
						4" Ice	8.3197	10.8330	0.60
(2) APL866513-42T0 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice	4.5308	4.9208	0.03
						1/2" Ice	4.9675	5.5962	0.08
						1" Ice	5.4135	6.2837	0.13
						2" Ice	6.3370	7.7123	0.25
						4" Ice	8.3197	10.8330	0.60
(2) APL866513-42T0 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice	4.5308	4.9208	0.03
						1/2" Ice	4.9675	5.5962	0.08
						1" Ice	5.4135	6.2837	0.13
						2" Ice	6.3370	7.7123	0.25
						4" Ice	8.3197	10.8330	0.60
(2) FD9R6004/2C-3L	A	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice	0.3665	0.0846	0.00
						1/2" Ice	0.4506	0.1362	0.01
						1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
(2) FD9R6004/2C-3L	B	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice	0.3665	0.0846	0.00
						1/2" Ice	0.4506	0.1362	0.01
						1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
(2) FD9R6004/2C-3L	C	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice	0.3665	0.0846	0.00
						1/2" Ice	0.4506	0.1362	0.01
						1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
(3) SBNHH-1D65B w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice	8.6393	7.0730	0.07
						1/2" Ice	9.2963	8.2637	0.14
						1" Ice	9.9210	9.1753	0.21
						2" Ice	11.1952	11.0130	0.39
						4" Ice	13.8631	15.0524	0.90

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
(3) SBNHH-1D65B w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6393 9.2963 9.9210 11.1952 13.8631	7.0730 8.2637 9.1753 11.0130 15.0524	0.07 0.14 0.21 0.39 0.90
(3) SBNHH-1D65B w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6393 9.2963 9.9210 11.1952 13.8631	7.0730 8.2637 9.1753 11.0130 15.0524	0.07 0.14 0.21 0.39 0.90
RRH2x60-700	A	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.9569 4.2724 4.5965 5.2705 6.7224	1.8157 2.0752 2.3603 2.9566 4.2529	0.06 0.08 0.11 0.17 0.35
RRH2x60-700	B	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.9569 4.2724 4.5965 5.2705 6.7224	1.8157 2.0752 2.3603 2.9566 4.2529	0.06 0.08 0.11 0.17 0.35
RRH2x60-700	C	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.9569 4.2724 4.5965 5.2705 6.7224	1.8157 2.0752 2.3603 2.9566 4.2529	0.06 0.08 0.11 0.17 0.35
RRH2X60-PCS	A	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5667 2.7914 3.0247 3.5173 4.6062	2.0106 2.2184 2.4349 2.8938 3.9152	0.06 0.08 0.10 0.16 0.31
RRH2X60-PCS	B	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5667 2.7914 3.0247 3.5173 4.6062	2.0106 2.2184 2.4349 2.8938 3.9152	0.06 0.08 0.10 0.16 0.31
RRH2X60-PCS	C	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5667 2.7914 3.0247 3.5173 4.6062	2.0106 2.2184 2.4349 2.8938 3.9152	0.06 0.08 0.10 0.16 0.31
RRH4X45-AWS4 B66	A	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1033 3.3578 3.6210 4.1732 5.3814	1.7586 1.9794 2.2088 2.6936 3.7670	0.06 0.08 0.11 0.17 0.33
RRH4X45-AWS4 B66	B	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1033 3.3578 3.6210 4.1732 5.3814	1.7586 1.9794 2.2088 2.6936 3.7670	0.06 0.08 0.11 0.17 0.33
RRH4X45-AWS4 B66	C	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.1033 3.3578 3.6210 4.1732 5.3814	1.7586 1.9794 2.2088 2.6936 3.7670	0.06 0.08 0.11 0.17 0.33

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
DB-T1-6Z-8AB-0Z	A	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.6000 5.9154 6.2395 6.9136 8.3654	2.3333 2.5580 2.7914 3.2840 4.3728	0.04 0.08 0.12 0.21 0.45
DB-B1-6C-8AB-0Z	A	From Face	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.6000 5.9154 6.2395 6.9136 8.3654	2.3333 2.5580 2.7914 3.2840 4.3728	0.04 0.08 0.12 0.21 0.45
Platform Mount [LP 304-1]	C	None		0.00	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	17.4600 22.4400 27.4200 37.3800 57.3000	17.4600 22.4400 27.4200 37.3800 57.3000	1.35 1.62 1.90 2.45 3.55
***									
7770.00 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.2208 6.7144 7.2182 8.2568 10.4762	4.8204 5.5082 6.2127 7.6716 11.0613	0.09 0.14 0.21 0.36 0.76
7770.00 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.2208 6.7144 7.2182 8.2568 10.4762	4.8204 5.5082 6.2127 7.6716 11.0613	0.09 0.14 0.21 0.36 0.76
7770.00 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.2208 6.7144 7.2182 8.2568 10.4762	4.8204 5.5082 6.2127 7.6716 11.0613	0.09 0.14 0.21 0.36 0.76
P65-16-XLH-RR w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6375 9.2903 9.9098 11.1763 13.8289	6.3625 7.5378 8.4270 10.2390 14.0988	0.08 0.14 0.22 0.39 0.89
P65-16-XLH-RR w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6375 9.2903 9.9098 11.1763 13.8289	6.3625 7.5378 8.4270 10.2390 14.0988	0.08 0.14 0.22 0.39 0.89
P65-16-XLH-RR w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6375 9.2903 9.9098 11.1763 13.8289	6.3625 7.5378 8.4270 10.2390 14.0988	0.08 0.14 0.22 0.39 0.89
(2) LGP21401	A	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.3640 0.4785 0.6017 0.8739 1.5220	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice	1.2880 1.4453 1.6112	0.3640 0.4785 0.6017	0.01 0.02 0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	1.9690	0.8739	0.05
						2" Ice	2.7882	1.5220	0.14
						4" Ice			
(2) LGP21401	C	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice	1.2880	0.3640	0.01
						1/2" Ice	1.4453	0.4785	0.02
							1.6112	0.6017	0.03
						1" Ice	1.9690	0.8739	0.05
						2" Ice	2.7882	1.5220	0.14
						4" Ice			
DC6-48-60-18-8F	A	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice	1.4667	1.4667	0.02
						1/2" Ice	1.6667	1.6667	0.04
							1.8778	1.8778	0.06
						1" Ice	2.3333	2.3333	0.11
						2" Ice	3.3778	3.3778	0.24
						4" Ice			
(2) RRUS-11	A	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice	3.2486	1.3726	0.05
						1/2" Ice	3.4905	1.5510	0.07
							3.7411	1.7380	0.09
						1" Ice	4.2682	2.1381	0.15
						2" Ice	5.4260	3.0418	0.31
						4" Ice			
(2) RRUS-11	B	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice	3.2486	1.3726	0.05
						1/2" Ice	3.4905	1.5510	0.07
							3.7411	1.7380	0.09
						1" Ice	4.2682	2.1381	0.15
						2" Ice	5.4260	3.0418	0.31
						4" Ice			
(2) RRUS-11	C	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice	3.2486	1.3726	0.05
						1/2" Ice	3.4905	1.5510	0.07
							3.7411	1.7380	0.09
						1" Ice	4.2682	2.1381	0.15
						2" Ice	5.4260	3.0418	0.31
						4" Ice			
Platform Mount [LP 304-1]	C	None		0.00	110.0000	No Ice	17.4600	17.4600	1.35
						1/2" Ice	22.4400	22.4400	1.62
							27.4200	27.4200	1.90
						1" Ice	37.3800	37.3800	2.45
						2" Ice	57.3000	57.3000	3.55
						4" Ice			

**

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 150.0000-133.0000	141.2530	1.515	28.022	33.880	A	0.000	33.880	33.880	100.00	0.000	0.000
					B	0.000	33.880		100.00	0.000	0.000
					C	0.000	33.880		100.00	0.000	0.000
L2 133.0000-98.4200	115.0661	1.429	26.401	85.829	A	0.000	85.829	85.829	100.00	0.000	0.000
					B	0.000	85.829		100.00	0.000	0.000
					C	0.000	85.829		100.00	0.000	11.318
L3 98.4200-64.7500	81.2130	1.293	23.876	105.479	A	0.000	105.479	105.479	100.00	0.000	0.000
					B	0.000	105.479		100.00	0.000	0.000
					C	0.000	105.479		100.00	0.000	13.333
L4 64.7500-	48.2471	1.115	20.50	123.19	A	0.000	123.190	123.190	100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
31.9200			5	0	B	0.000	123.190		100.00	0.000	0.000
					C	0.000	123.190		100.00	0.000	13.001
L5 31.9200-0.0000	15.5618	1	18.496	138.896	A	0.000	138.896	138.896	100.00	0.000	0.000
					B	0.000	138.896		100.00	0.000	0.000
					C	0.000	138.896		100.00	0.000	12.640

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-133.0000	141.2530	1.515	5.483	0.8930	36.410	A	0.000	36.410	36.410	100.00	0.000	0.000
						B	0.000	36.410		100.00	0.000	0.000
						C	0.000	36.410		100.00	0.000	0.000
L2 133.0000-98.4200	115.0661	1.429	5.166	0.8713	90.975	A	0.000	90.975	90.975	100.00	0.000	0.000
						B	0.000	90.975		100.00	0.000	0.000
						C	0.000	90.975		100.00	0.000	21.526
L3 98.4200-64.7500	81.2130	1.293	4.672	0.8356	110.368	A	0.000	110.368	110.368	100.00	0.000	0.000
						B	0.000	110.368		100.00	0.000	0.000
						C	0.000	110.368		100.00	0.000	25.068
L4 64.7500-31.9200	48.2471	1.115	4.012	0.7850	127.763	A	0.000	127.763	127.763	100.00	0.000	0.000
						B	0.000	127.763		100.00	0.000	0.000
						C	0.000	127.763		100.00	0.000	23.974
L5 31.9200-0.0000	15.5618	1	3.619	0.7500	143.072	A	0.000	143.072	143.072	100.00	0.000	0.000
						B	0.000	143.072		100.00	0.000	0.000
						C	0.000	143.072		100.00	0.000	22.663

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-133.0000	141.2530	1.515	9.696	33.880	A	0.000	33.880	33.880	100.00	0.000	0.000
					B	0.000	33.880		100.00	0.000	0.000
					C	0.000	33.880		100.00	0.000	0.000
L2 133.0000-98.4200	115.0661	1.429	9.135	85.829	A	0.000	85.829	85.829	100.00	0.000	0.000
					B	0.000	85.829		100.00	0.000	0.000
					C	0.000	85.829		100.00	0.000	11.318
L3 98.4200-64.7500	81.2130	1.293	8.262	105.479	A	0.000	105.479	105.479	100.00	0.000	0.000
					B	0.000	105.479		100.00	0.000	0.000
					C	0.000	105.479		100.00	0.000	13.333
L4 64.7500-31.9200	48.2471	1.115	7.095	123.190	A	0.000	123.190	123.190	100.00	0.000	0.000
					B	0.000	123.190		100.00	0.000	0.000
					C	0.000	123.190		100.00	0.000	13.001
L5 31.9200-0.0000	15.5618	1	6.400	138.896	A	0.000	138.896	138.896	100.00	0.000	0.000
					B	0.000	138.896		100.00	0.000	0.000
					C	0.000	138.896		100.00	0.000	12.640

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	150 - 133	Pole	Max Tension	5	0.00	0.00	-0.00
			Max. Compression	14	-9.27	0.02	-0.00
			Max. Mx	11	-4.25	73.79	0.02
			Max. My	2	-4.26	0.03	73.78
			Max. Vy	11	-9.96	73.79	0.02
			Max. Vx	8	9.95	-0.00	-73.78
			Max. Torque	2			0.00
L2	133 - 98.42	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.41	2.26	0.16
			Max. Mx	11	-12.61	662.48	3.47
			Max. My	2	-12.63	3.97	658.12
			Max. Vy	11	-23.62	662.48	3.47
			Max. Vx	8	23.46	-2.73	-657.83
			Max. Torque	3			1.46
L3	98.42 - 64.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.70	3.75	-0.66
			Max. Mx	11	-19.05	1490.61	7.74
			Max. My	8	-19.06	-6.81	-1480.72
			Max. Vy	11	-26.80	1490.61	7.74
			Max. Vx	8	26.65	-6.81	-1480.72
			Max. Torque	3			1.53
L4	64.75 -	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
	31.92						
			Max. Compression	14	-42.28	5.33	-1.57
			Max. Mx	11	-26.79	2396.55	11.83
			Max. My	8	-26.80	-10.73	-2381.55
			Max. Vy	11	-29.70	2396.55	11.83
			Max. Vx	8	29.55	-10.73	-2381.55
			Max. Torque	3			1.60
L5	31.92 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-54.97	7.33	-2.72
			Max. Mx	11	-37.32	3566.76	16.49
			Max. My	8	-37.32	-15.18	-3545.84
			Max. Vy	11	-32.79	3566.76	16.49
			Max. Vx	8	32.64	-15.18	-3545.84
			Max. Torque	2			1.69

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	54.97	-0.00	0.00
	Max. H_x	11	37.34	32.77	0.13
	Max. H_z	2	37.34	0.13	32.62
	Max. M_x	2	3544.79	0.13	32.62
	Max. M_z	5	3562.86	-32.77	-0.13
	Max. Torsion	2	1.69	0.13	32.62
	Min. Vert	5	37.34	-32.77	-0.13
	Min. H_x	5	37.34	-32.77	-0.13
	Min. H_z	8	37.34	-0.13	-32.62
	Min. M_x	8	-3545.84	-0.13	-32.62
	Min. M_z	11	-3566.76	32.77	0.13
	Min. Torsion	8	-1.69	-0.13	-32.62

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	37.34	0.00	0.00	0.52	1.79	0.00
Dead+Wind 0 deg - No Ice	37.34	-0.13	-32.62	-3544.79	18.86	-1.69
Dead+Wind 30 deg - No Ice	37.34	16.27	-28.18	-3061.42	-1765.97	-1.68
Dead+Wind 60 deg - No Ice	37.34	28.31	-16.20	-1757.45	-3077.10	-1.22
Dead+Wind 90 deg - No Ice	37.34	32.77	0.13	17.55	-3562.86	-0.43
Dead+Wind 120 deg - No Ice	37.34	28.44	16.42	1787.94	-3094.04	0.47
Dead+Wind 150 deg - No Ice	37.34	16.50	28.31	3079.42	-1795.41	1.25
Dead+Wind 180 deg - No Ice	37.34	0.13	32.62	3545.84	-15.18	1.69
Dead+Wind 210 deg - No Ice	37.34	-16.27	28.18	3062.47	1769.65	1.68
Dead+Wind 240 deg - No Ice	37.34	-28.31	16.20	1758.50	3080.78	1.22
Dead+Wind 270 deg - No Ice	37.34	-32.77	-0.13	-16.49	3566.76	0.43
Dead+Wind 300 deg - No Ice	37.34	-28.44	-16.42	-1786.89	3097.73	-0.47
Dead+Wind 330 deg - No Ice	37.34	-16.50	-28.31	-3078.37	1799.10	-1.25
Dead+Ice	54.97	0.00	-0.00	2.72	7.33	-0.00
Dead+Wind 0 deg+Ice	54.97	-0.03	-7.81	-879.14	11.05	-0.45
Dead+Wind 30 deg+Ice	54.97	3.90	-6.75	-759.20	-432.45	-0.42
Dead+Wind 60 deg+Ice	54.97	6.78	-3.88	-435.09	-758.07	-0.28
Dead+Wind 90 deg+Ice	54.97	7.84	0.03	6.34	-878.56	-0.06
Dead+Wind 120 deg+Ice	54.97	6.80	3.93	446.82	-761.64	0.18
Dead+Wind 150 deg+Ice	54.97	3.94	6.78	768.32	-438.64	0.36
Dead+Wind 180 deg+Ice	54.97	0.03	7.81	884.68	3.90	0.45
Dead+Wind 210 deg+Ice	54.97	-3.90	6.75	764.74	447.40	0.42
Dead+Wind 240 deg+Ice	54.97	-6.78	3.88	440.63	773.02	0.28

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 270 deg+Ice	54.97	-7.84	-0.03	-0.80	893.51	0.06
Dead+Wind 300 deg+Ice	54.97	-6.80	-3.93	-441.28	776.59	-0.18
Dead+Wind 330 deg+Ice	54.97	-3.94	-6.78	-762.77	453.59	-0.36
Dead+Wind 0 deg - Service	37.34	-0.04	-11.29	-1227.51	7.75	-0.59
Dead+Wind 30 deg - Service	37.34	5.63	-9.75	-1060.10	-610.50	-0.59
Dead+Wind 60 deg - Service	37.34	9.80	-5.60	-608.42	-1064.67	-0.43
Dead+Wind 90 deg - Service	37.34	11.34	0.04	6.42	-1232.99	-0.15
Dead+Wind 120 deg - Service	37.34	9.84	5.68	619.68	-1070.56	0.16
Dead+Wind 150 deg - Service	37.34	5.71	9.80	1067.05	-620.71	0.43
Dead+Wind 180 deg - Service	37.34	0.04	11.29	1228.56	-4.04	0.59
Dead+Wind 210 deg - Service	37.34	-5.63	9.75	1061.15	614.21	0.59
Dead+Wind 240 deg - Service	37.34	-9.80	5.60	609.48	1068.38	0.43
Dead+Wind 270 deg - Service	37.34	-11.34	-0.04	-5.37	1236.69	0.15
Dead+Wind 300 deg - Service	37.34	-9.84	-5.68	-618.63	1074.27	-0.16
Dead+Wind 330 deg - Service	37.34	-5.71	-9.80	-1066.00	624.42	-0.43

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-37.34	0.00	0.00	37.34	0.00	0.000%
2	-0.13	-37.34	-32.62	0.13	37.34	32.62	0.002%
3	16.27	-37.34	-28.18	-16.27	37.34	28.18	0.000%
4	28.31	-37.34	-16.20	-28.31	37.34	16.20	0.000%
5	32.77	-37.34	0.13	-32.77	37.34	-0.13	0.005%
6	28.44	-37.34	16.42	-28.44	37.34	-16.42	0.000%
7	16.50	-37.34	28.31	-16.50	37.34	-28.31	0.000%
8	0.13	-37.34	32.62	-0.13	37.34	-32.62	0.002%
9	-16.27	-37.34	28.18	16.27	37.34	-28.18	0.000%
10	-28.31	-37.34	16.20	28.31	37.34	-16.20	0.000%
11	-32.77	-37.34	-0.13	32.77	37.34	0.13	0.002%
12	-28.44	-37.34	-16.42	28.44	37.34	16.42	0.000%
13	-16.50	-37.34	-28.31	16.50	37.34	28.31	0.000%
14	0.00	-54.97	0.00	-0.00	54.97	0.00	0.000%
15	-0.03	-54.97	-7.81	0.03	54.97	7.81	0.002%
16	3.90	-54.97	-6.75	-3.90	54.97	6.75	0.002%
17	6.78	-54.97	-3.88	-6.78	54.97	3.88	0.002%
18	7.84	-54.97	0.03	-7.84	54.97	-0.03	0.002%
19	6.80	-54.97	3.93	-6.80	54.97	-3.93	0.002%
20	3.94	-54.97	6.78	-3.94	54.97	-6.78	0.002%
21	0.03	-54.97	7.81	-0.03	54.97	-7.81	0.002%
22	-3.90	-54.97	6.75	3.90	54.97	-6.75	0.002%
23	-6.78	-54.97	3.88	6.78	54.97	-3.88	0.002%
24	-7.84	-54.97	-0.03	7.84	54.97	0.03	0.002%
25	-6.80	-54.97	-3.93	6.80	54.97	3.93	0.002%
26	-3.94	-54.97	-6.78	3.94	54.97	6.78	0.002%
27	-0.04	-37.34	-11.29	0.04	37.34	11.29	0.002%
28	5.63	-37.34	-9.75	-5.63	37.34	9.75	0.001%
29	9.80	-37.34	-5.60	-9.80	37.34	5.60	0.001%
30	11.34	-37.34	0.04	-11.34	37.34	-0.04	0.002%
31	9.84	-37.34	5.68	-9.84	37.34	-5.68	0.001%
32	5.71	-37.34	9.80	-5.71	37.34	-9.80	0.001%
33	0.04	-37.34	11.29	-0.04	37.34	-11.29	0.002%
34	-5.63	-37.34	9.75	5.63	37.34	-9.75	0.001%
35	-9.80	-37.34	5.60	9.80	37.34	-5.60	0.001%
36	-11.34	-37.34	-0.04	11.34	37.34	0.04	0.002%
37	-9.84	-37.34	-5.68	9.84	37.34	5.68	0.001%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
38	-5.71	-37.34	-9.80	5.71	37.34	9.80	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	8	0.00000001	0.00009296
3	Yes	11	0.00000001	0.00007863
4	Yes	11	0.00000001	0.00008206
5	Yes	7	0.00005901	0.00008501
6	Yes	11	0.00000001	0.00008279
7	Yes	11	0.00000001	0.00008134
8	Yes	8	0.00000001	0.00005757
9	Yes	11	0.00000001	0.00008257
10	Yes	11	0.00000001	0.00007926
11	Yes	8	0.00000001	0.00005602
12	Yes	11	0.00000001	0.00008249
13	Yes	11	0.00000001	0.00008381
14	Yes	4	0.00000001	0.00000466
15	Yes	7	0.00013452	0.00004086
16	Yes	7	0.00013435	0.00011337
17	Yes	7	0.00013434	0.00013430
18	Yes	7	0.00013449	0.00003212
19	Yes	7	0.00013431	0.00013172
20	Yes	7	0.00013431	0.00012072
21	Yes	7	0.00013449	0.00003941
22	Yes	7	0.00013432	0.00014409
23	Yes	7	0.00013433	0.00012288
24	Yes	7	0.00013451	0.00003329
25	Yes	7	0.00013434	0.00013116
26	Yes	7	0.00013434	0.00014222
27	Yes	7	0.00000001	0.00005394
28	Yes	8	0.00000001	0.00008779
29	Yes	8	0.00000001	0.00009992
30	Yes	7	0.00000001	0.00004184
31	Yes	8	0.00000001	0.00009807
32	Yes	8	0.00000001	0.00009300
33	Yes	7	0.00000001	0.00005000
34	Yes	8	0.00000001	0.00010195
35	Yes	8	0.00000001	0.00008994
36	Yes	7	0.00000001	0.00004394
37	Yes	8	0.00000001	0.00009706
38	Yes	8	0.00000001	0.00010196

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 133	31.90	37	1.77	0.00
L2	135.92 - 98.42	26.70	37	1.74	0.00
L3	102.25 - 64.75	15.32	37	1.41	0.00
L4	69.42 - 31.92	7.05	37	0.96	0.00
L5	37.42 - 0	2.06	37	0.50	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
148.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	37	31.15	1.77	0.00	36347
138.0000	APXVSPP18-C-A20 w/ Mount Pipe	37	27.46	1.75	0.00	15164
127.0000	(2) APL866513-42T0 w/ Mount Pipe	37	23.48	1.69	0.00	8186
110.0000	7770.00 w/ Mount Pipe	37	17.72	1.51	0.00	4821

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 133	91.80	12	5.11	0.01
L2	135.92 - 98.42	76.85	12	5.02	0.01
L3	102.25 - 64.75	44.13	12	4.08	0.00
L4	69.42 - 31.92	20.32	12	2.77	0.00
L5	37.42 - 0	5.94	12	1.45	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
148.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	12	89.66	5.10	0.01	12811
138.0000	APXVSPP18-C-A20 w/ Mount Pipe	12	79.04	5.05	0.01	5344
127.0000	(2) APL866513-42T0 w/ Mount Pipe	12	67.62	4.87	0.01	2886
110.0000	7770.00 w/ Mount Pipe	12	51.05	4.36	0.01	1697

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	150 - 133 (1)	TP26x21.83x0.25	17.0000	0.0000	0.0	39.00	19.8643	-4.25	774.71	0.005
L2	133 - 98.42 (2)	TP34.0625x24.7837x0.3125	37.5000	0.0000	0.0	39.00	32.5358	-12.60	1268.90	0.010
L3	98.42 - 64.75 (3)	TP41.75x32.4898x0.375	37.5000	0.0000	0.0	39.00	47.8740	-19.04	1867.09	0.010
L4	64.75 - 31.92 (4)	TP49.0625x39.8468x0.375	37.5000	0.0000	0.0	39.00	56.3415	-26.79	2197.32	0.012
L5	31.92 - 0 (5)	TP56.125x46.9609x0.375	37.4200	0.0000	0.0	39.00	66.3564	-37.32	2587.90	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	150 - 133 (1)	TP26x21.83x0.25	73.80	7.23	39.00	0.185	0.00	0.00	39.00	0.000
L2	133 - 98.42 (2)	TP34.0625x24.7837x0.3125	664.41	30.32	39.00	0.778	0.00	0.00	39.00	0.000
L3	98.42 - 64.75 (3)	TP41.75x32.4898x0.375	1494.98	37.81	39.00	0.970	0.00	0.00	39.00	0.000
L4	64.75 - 31.92 (4)	TP49.0625x39.8468x0.375	2403.28	43.82	39.00	1.124	0.00	0.00	39.00	0.000
L5	31.92 - 0 (5)	TP56.125x46.9609x0.375	3576.16	46.96	39.00	1.204	0.00	0.00	39.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	150 - 133 (1)	TP26x21.83x0.25	9.96	0.50	26.00	0.039	0.00	0.00	26.00	0.000
L2	133 - 98.42 (2)	TP34.0625x24.7837x0.3125	23.70	0.73	26.00	0.056	0.08	0.00	26.00	0.000
L3	98.42 - 64.75 (3)	TP41.75x32.4898x0.375	26.88	0.56	26.00	0.043	0.20	0.00	26.00	0.000
L4	64.75 - 31.92 (4)	TP49.0625x39.8468x0.375	29.78	0.53	26.00	0.041	0.32	0.00	26.00	0.000
L5	31.92 - 0 (5)	TP56.125x46.9609x0.375	32.87	0.50	26.00	0.038	0.47	0.00	26.00	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 133 (1)	0.005	0.185	0.000	0.039	0.000	0.191 ✔	1.333	H1-3+VT ✔
L2	133 - 98.42 (2)	0.010	0.778	0.000	0.056	0.000	0.788 ✔	1.333	H1-3+VT ✔
L3	98.42 - 64.75 (3)	0.010	0.970	0.000	0.043	0.000	0.980 ✔	1.333	H1-3+VT ✔
L4	64.75 - 31.92 (4)	0.012	1.124	0.000	0.041	0.000	1.136 ✔	1.333	H1-3+VT ✔
L5	31.92 - 0 (5)	0.014	1.204	0.000	0.038	0.000	1.219 ✔	1.333	H1-3+VT ✔

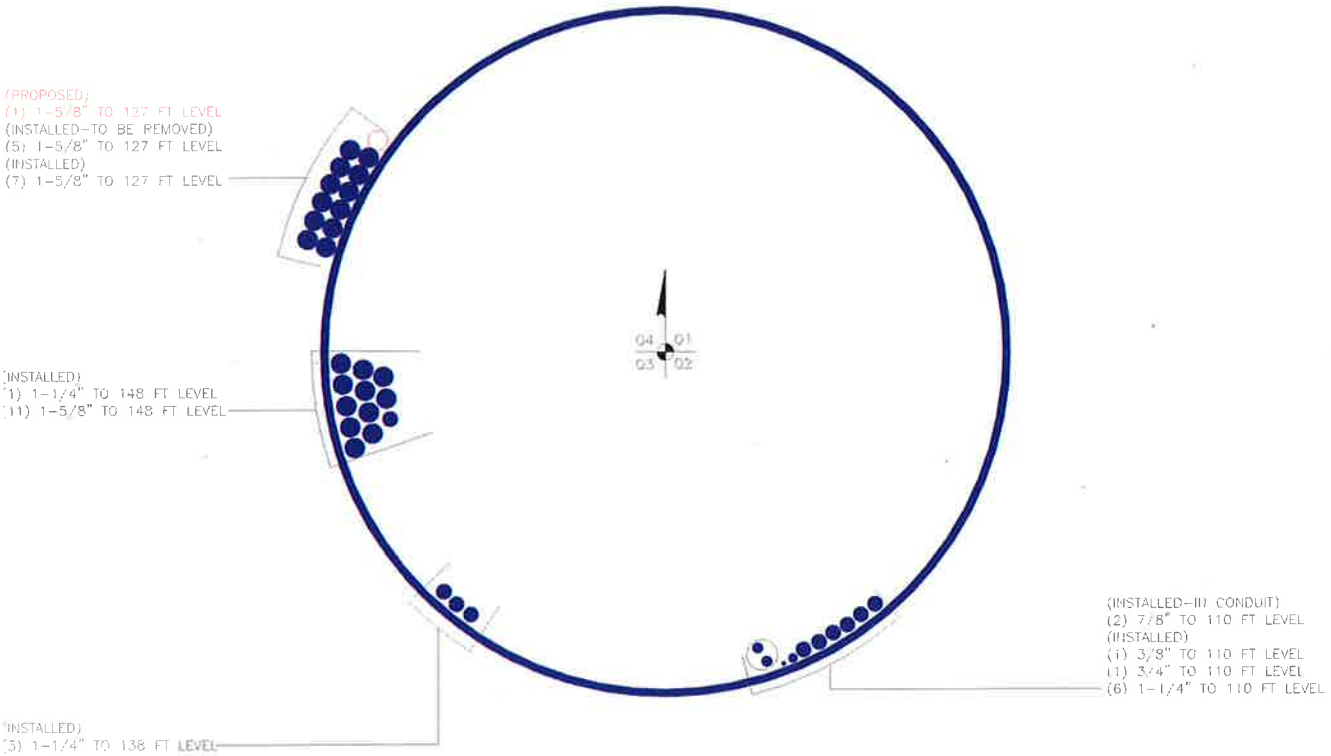
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	150 - 133	Pole	TP26x21.83x0.25	1	-4.25	1032.68	14.4	Pass
L2	133 - 98.42	Pole	TP34.0625x24.7837x0.3125	2	-12.60	1691.44	59.1	Pass
L3	98.42 - 64.75	Pole	TP41.75x32.4898x0.375	3	-19.04	2488.83	73.5	Pass
L4	64.75 - 31.92	Pole	TP49.0625x39.8468x0.375	4	-26.79	2929.03	85.2	Pass
L5	31.92 - 0	Pole	TP56.125x46.9609x0.375	5	-37.32	3449.67	91.4	Pass
							Summary	
						Pole (L5)	91.4	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
						RATING =	**91.4**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

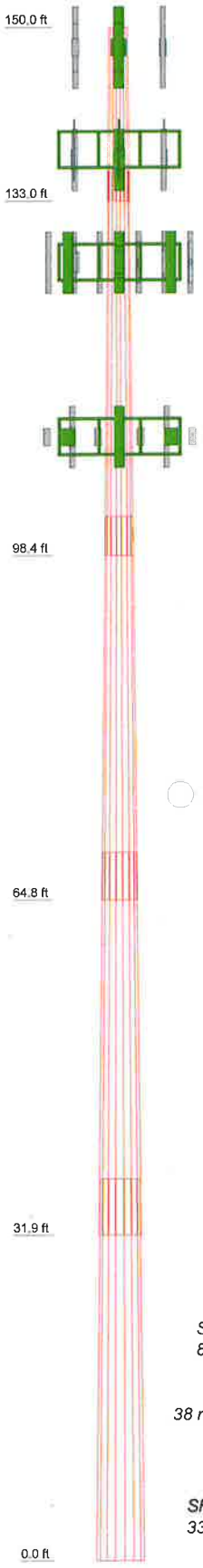

(PROPOSED)
(1) 1-5/8" TO 127 FT LEVEL
(INSTALLED-TO BE REMOVED)
(5) 1-5/8" TO 127 FT LEVEL
(INSTALLED)
(7) 1-5/8" TO 127 FT LEVEL
(INSTALLED)
(1) 1-1/4" TO 148 FT LEVEL
(11) 1-5/8" TO 148 FT LEVEL
(INSTALLED)
(3) 1-1/4" TO 138 FT LEVEL
(INSTALLED-IN CONDUIT)
(2) 7/8" TO 110 FT LEVEL
(INSTALLED)
(1) 3/8" TO 110 FT LEVEL
(1) 3/4" TO 110 FT LEVEL
(6) 1-1/4" TO 110 FT LEVEL
Q4
Q1
Q3
Q2

APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5
Length (ft)	17.0000	37.5000	37.5000	37.5000	37.4200
Number of Sides	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.3750	0.3750
Socket Length (ft)	2.9200	3.8300	4.6700	5.5000	
Top Dia (in)	21.8300	24.7837	32.4898	39.8468	46.9609
Bot Dia (in)	26.0000	34.0625	41.7500	49.0625	56.1250
Grade	A572-65				
Weight (K)	1.1	3.7	5.6	6.7	7.8

24.8



AXIAL
55 K

SHEAR
8 K

MOMENT
894 kip-ft

TORQUE 0 kip-ft
38 mph WIND - 0.7500 in ICE

AXIAL
37 K

SHEAR
33 K

MOMENT
3576 kip-ft

TORQUE 2 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	148	(2) APL866513-42T0 w/ Mount Pipe	127
		(2) APL866513-42T0 w/ Mount Pipe	127
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	148	(2) APL866513-42T0 w/ Mount Pipe	127
		(2) FD9R6004/2C-3L	127
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	148	(2) FD9R6004/2C-3L	127
		(2) FD9R6004/2C-3L	127
LNX-6515DS-VTM w/ Mount Pipe	148	(3) SBNHH-1D65B w/ Mount Pipe	127
LNX-6515DS-VTM w/ Mount Pipe	148	(3) SBNHH-1D65B w/ Mount Pipe	127
LNX-6515DS-VTM w/ Mount Pipe	148	(3) SBNHH-1D65B w/ Mount Pipe	127
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	148	RRH2x60-700	127
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	148	RRH2x60-700	127
		RRH2x60-700	127
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	148	RRH2X60-PCS	127
		RRH2X60-PCS	127
KRY 112 144/1	148	RRH2X60-PCS	127
KRY 112 144/1	148	RRH4X45-AWS4 B66	127
KRY 112 144/1	148	RRH4X45-AWS4 B66	127
RRUS 11 B12	148	RRH4X45-AWS4 B66	127
RRUS 11 B12	148	DB-T1-6Z-8AB-0Z	127
RRUS 11 B12	148	DB-B1-6C-8AB-0Z	127
Sector Mount [SM 410-3]	148	Platform Mount [LP 304-1]	127
APXVSPP18-C-A20 w/ Mount Pipe	138	7770.00 w/ Mount Pipe	110
APXVSPP18-C-A20 w/ Mount Pipe	138	7770.00 w/ Mount Pipe	110
APXVSPP18-C-A20 w/ Mount Pipe	138	7770.00 w/ Mount Pipe	110
800MHZ RRH	138	P65-16-XLH-RR w/ Mount Pipe	110
800MHZ RRH	138	P65-16-XLH-RR w/ Mount Pipe	110
800MHZ RRH	138	P65-16-XLH-RR w/ Mount Pipe	110
1900MHz RRH	138	(2) LGP21401	110
1900MHz RRH	138	(2) LGP21401	110
1900MHz RRH	138	(2) LGP21401	110
Platform Mount [LP 601-1]	138	DC6-48-60-18-8F	110
(3) 2.375" OD x 6' Mount Pipe	138	(2) RRUS-11	110
(3) 2.375" OD x 6' Mount Pipe	138	(2) RRUS-11	110
(3) 2.375" OD x 6' Mount Pipe	138	(2) RRUS-11	110
		Platform Mount [LP 304-1]	110

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 91.4%

Paul J Ford and Company
250 E. Broad Street Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.44105

Job: 150' Monopole / Newtown			
Project: PJF 37515-3231 / BU 826222			
Client: Crown Castle	Drawn by: Robert Koors	App'd:	
Code: TIA/EIA-222-F	Date: 11/20/15	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

v4.4 - Effective 7-12-13

Date: 11/20/2015
PJF Project: 37515-3231.001.7700
Client Ref. # 826222
Site Name: Newtown
Description: Description
Owner: Crown Castle
Engineer: RMK

Asymmetric Anchor Rod Analysis

Moment =	3576	k-ft	TIA Ref.	F	Location =	Base Plate	
Axial =	37.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	33.0	kips	Max Ratio =	105.0%	Threads =	N/A	for FP, Rev. G
Anchor Qty =	45						

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

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	Other	105	125	4.6	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
2	1.250	Other	105	125	13.8	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
3	1.250	Other	105	125	23.1	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
4	1.250	Other	105	125	32.3	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
5	1.250	Other	105	125	41.5	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
6	1.250	Other	105	125	50.8	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
7	1.250	Other	105	125	60.0	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
8	1.250	Other	105	125	69.2	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
9	1.250	Other	105	125	78.5	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
10	1.250	Other	105	125	87.7	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
11	1.250	Other	105	125	96.9	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
12	1.250	Other	105	125	106.2	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
13	1.250	Other	105	125	115.4	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
14	1.250	Other	105	125	124.6	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
15	1.250	Other	105	125	133.8	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
16	1.250	Other	105	125	143.1	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
17	1.250	Other	105	125	152.3	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
18	1.250	Other	105	125	161.5	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
19	1.250	Other	105	125	170.8	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
20	1.250	Other	105	125	180.0	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
21	1.250	Other	105	125	189.2	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
22	1.250	Other	105	125	198.5	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
23	1.250	Other	105	125	207.7	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
24	1.250	Other	105	125	216.9	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
25	1.250	Other	105	125	226.2	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
26	1.250	Other	105	125	235.4	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
27	1.250	Other	105	125	244.6	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
28	1.250	Other	105	125	253.8	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
29	1.250	Other	105	125	263.1	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
30	1.250	Other	105	125	272.3	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
31	1.250	Other	105	125	281.5	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
32	1.250	Other	105	125	290.8	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
33	1.250	Other	105	125	300.0	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
34	1.250	Other	105	125	309.2	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
35	1.250	Other	105	125	318.5	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
36	1.250	Other	105	125	327.7	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
37	1.250	Other	105	125	336.9	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
38	1.250	Other	105	125	346.2	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
39	1.250	Other	105	125	355.4	61.00	0.00	1.23	63.33	61.63	61.63	0.00	67.50	91.3%
40	1.000	Williams R71	127.7	150	28.0	71.13	0.00	0.91	54.53	53.27	53.27	0.00	59.93	88.9%
41	1.000	Williams R71	127.7	150	83.0	71.13	0.00	0.91	54.53	53.27	53.27	0.00	59.93	88.9%
42	1.000	Williams R71	127.7	150	148.0	71.13	0.00	0.91	54.53	53.27	53.27	0.00	59.93	88.9%
43	1.000	Williams R71	127.7	150	203.0	71.13	0.00	0.91	54.53	53.27	53.27	0.00	59.93	88.9%
44	1.000	Williams R71	127.7	150	268.0	71.13	0.00	0.91	54.53	53.27	53.27	0.00	59.93	88.9%
45	1.000	Williams R71	127.7	150	323.0	71.13	0.00	0.91	54.53	53.27	53.27	0.00	59.93	88.9%
								53.31						

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

TIA Rev F

Site Data

BU#: *826222*
Site Name: *Newtown/RT-25*
App #:

Pole Manufacturer:	*Other*

Reactions		
Moment:	3096.8	ft-kips
Axial:	32.3	kips
Shear:	28.7	kips

Reactions adjusted to account for additional anchor rods.

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

Anchor Rod Data		
Qty:	39	
Diam:	1.25	in
Rod Material:	Other	
Strength (Fu):	125	ksi
Yield (Fy):	105	ksi
Bolt Circle:	61	in

Plate Data		
Diam:	65	in
Thick:	1.5	in
Grade:	50	ksi
Single-Rod B-eff:	4.57	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.5	in
Width:	4	in
Height:	12	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	56.125	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	61.7 Kips	Service, ASD
Allowable Tension:	67.5 Kips	Fty*ASIF

See asymmetric spreadsheet

Base Plate Results

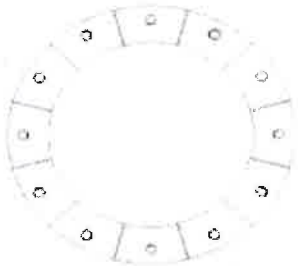
	Shear Check Only	Stiffened
Base Plate Stress:	5.3 ksi	Service, ASD
Allowable Plate Stress:	26.7 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	19.8% Pass	Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	61.4% Pass
Vertical Weld:	20.4% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	9.6% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	41.7% Pass
Plate Comp. (AISC Bracket):	43.3% Pass

Pole Results

Pole Punching Shear Check:	7.4% Pass



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

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

PJF job no. **37515-3231.001.7700** Project name **0**

Foundation Loads:

Pole weight or tower leg compression =	**37**	(kips)
Horizontal load at top of pier =	**33**	(kips)
Overturning moment at top of pier=	**2634**	(ft-kips)

Design criteria:

Safety factor against overturning =	**1.5**	

Soil Properties:

Soil density =	**125**	(pcf)
Allowable soil bearing =	**15**	(ksf)
Depth to water table =	**99**	(ft)

Dimensions:

Pier shape (round or square)	**R**	("R" or "S")
Pier width =	**7**	(ft)
Pier height above grade =	**0.5**	(ft)
depth to bottom of footing =	**6**	(ft)
Footing thickness =	**2**	(ft)
Footing width =	**21**	(ft)
Footing length =	**21**	(ft)

Concrete:

Concrete strength =	**4**	(ksi)
Rebar strength =	**60**	(ksi)
ultimate load factor =	**1.3**	

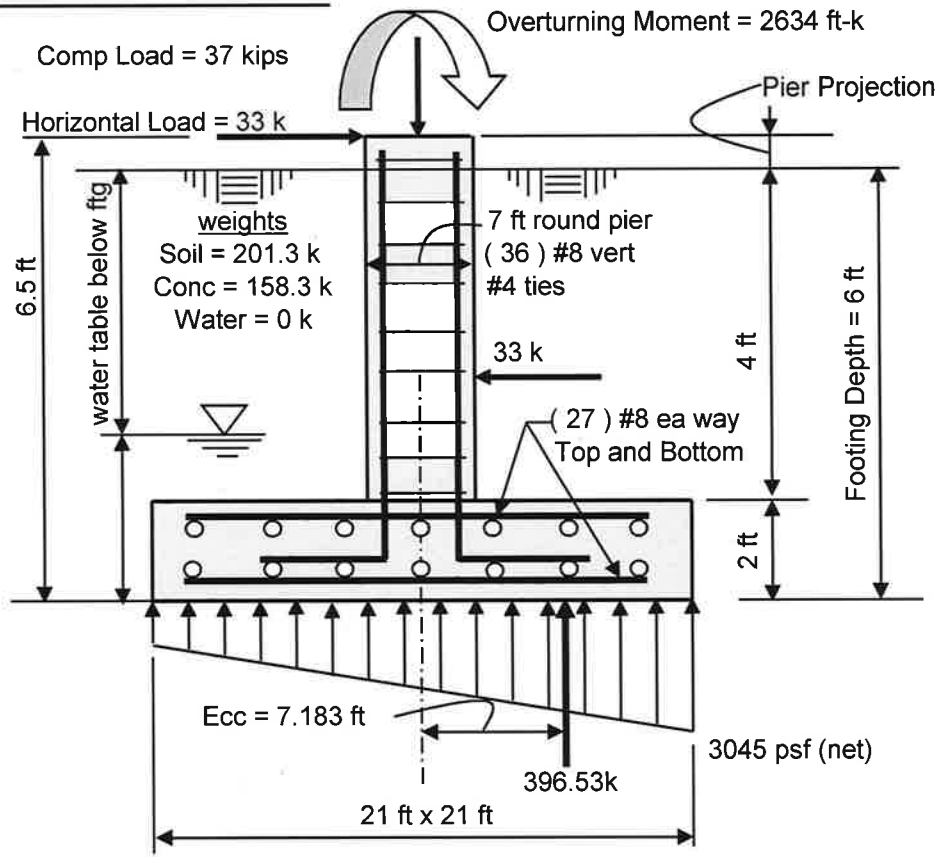
Reinforcing Steel:

	Pad	
minimum cover over rebar =	**3**	inches
size of pad rebar =	**#8**	bar
quantity of pad rebar =	**27**	(ea direction)

Reinforcing Steel:

	Pier	
size of vert rebar in pier=	**#8**	bar
vertical rebar quantity =	**36**	
size of pier ties =	**#4**	bar
minimum cover over rebar =	**3**	inches

Total volume of concrete = 39.1 cu yd



Summary of analysis results	
Maximum Net Soil Bearing = 3.045 ksf	Ult Bending Shear Capacity = 126 psi
Allowable Net Soil Bearing = 15 ksf	Ult Bending Shear Stress = 73 psi
Soil Bearing Stress Ratio = 0.2 Okay	**Bending Shear Stress Ratio = 0.58 Okay**

PJF job no. **37515-3231.001.7700** Project name **Newtown**

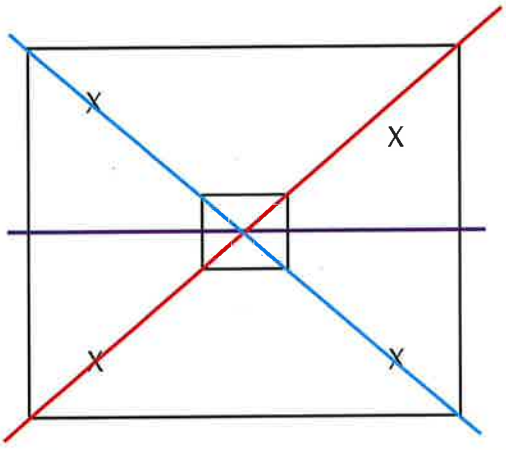
Total TNX Reactions:

Tower leg compression = **37** kips
Horizontal load at top of pier = **33** kips
Overturning moment at top of pier = **3576** ft-kips

Micropile Moment:

M = **942** ft-kips

Check Micropiles:



Side

Corner 1 Corner 2

I = N1*(Y1^2)+N2*(Y2^2)
F = My/I

Side:

N	Y
3	5.25
1	3.25

I = 93.3
F = 53

Corner 1:

N	Y
2	7.43
1	1.41

I = 112
F = 62.3

Corner 2:

N	Y
1	7.43
1	6.01

I = 91.3
F = 76.6

Micropile Capacity = 156.5 kips
Percent Capacity = **49.0%**

Check System Overturning (Into Side - About the Edge):

Weight of Concrete = 158.3 kips
Weight of Soil = 226.4 kips
Weight of Pole = 37.0 kips
Micropile = 156.5 kips

Total Resisting Moment, M_R = 7401.3 ft-kips
Total Moment Demand, M_o = 3724.5 ft-kips

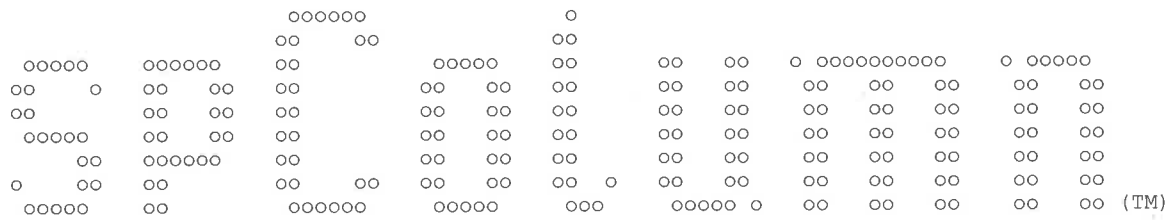
Total Safety Factor Provided = 1.99
Percent Capacity = **75.5%**

Check Pad In S.P. Column:

Mu (From Spread Footing Spreadsheet) = 1408.2 ft-kips
Mu (From Micropiles) = 241.3 ft-kips
Total Mu = 1649.5 ft-kips

Check Pier In Drilled Pier Steel Analysis Spreadsheet:

Pu = 37 kips
Mu = 4841.85 ft-kips



spColumn v4.80 (TM)
Computer program for the Strength Design of Reinforced Concrete Sections

General Information:
==========
File Name: T:\375_Crown_Castle\2015\37515-3231_826222_NEWTOWN-RT-25\3...\37515-3231.001.7700_Pad.col
Project:
Column:
Code: ACI 318-11

Engineer:
Units: English

Run Option: Investigation
Run Axis: X-axis

Slenderness: Not considered
Column Type: Structural

Material Properties:
==========
f'c = 4 ksi
Ec = 3605 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

fy = 60 ksi
Es = 29000 ksi

Section:
==========
Rectangular: Width = 252 in

Depth = 24 in

Gross section area, Ag = 6048 in^2
Ix = 290304 in^4
rx = 6.9282 in
Xo = 0 in

Iy = 3.2006e+007 in^4
ry = 72.7461 in
Yo = 0 in

Reinforcement:
==========
Bar Set: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Rectangular
Pattern: Sides Different (Cover to transverse reinforcement)
Total steel area: As = 42.66 in^2 at rho = 0.71% (Note: rho < 1.0%)
Minimum clear spacing = 8.39 in

	Top	Bottom	Left	Right
Bars	27 # 8	27 # 8	0 # 3	0 # 3
Cover(in)	3	3	3	3

Factored Loads and Moments with Corresponding Capacities:
==========

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu	NA depth in	Dt depth in	eps_t	Phi
1	0.00	1649.50	1968.06	1.193	2.77	20.13	0.01878	0.900

*** End of output ***

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

Job Number: 37515-3231.001.7805
Site Number: 826222
Site Name: Site Name
By: RMK
Date: 11/20/2015

DRILLED PIER STEEL ANALYSIS - STEEL CALCULATIONS - TIA-222-G

BASED ON ACI 318-05, SECTIONS 9 & 10 (ASSUMING TIE REINFORCEMENT)

Factored Internal Loads from Analysis

Reference Standard =	TIA-222-G	
ACI Code =	ACI 318-05	
Maximum Ratio =	105.0%	
Axial Load, Pu =	37.0	kips, (+Comp, -Tension)
Moment, Mu =	4841.9	k-ft (Must be Positive)
Depth to Analysis Section =	4.00	ft, from Grade

Factored Internal Loads

Load Factor =	1.0	
Axial Load, Pu = ΦPn =	37.0	kips
Moment, Mu =	4841.9	k-ft

Drilled Pier Geometry and Concrete Specifications

Diameter =	84	in
fc' =	4	ksi
εc =	0.003	in/in
β1 =	0.85	
Ag =	5541.8	in^2
Height Above Grade =	0.5	ft
Depth Below Grade =	6	ft

Nominal Axial Load and Moment

ΦPn(max) =	10822.6	kips
ΦPn(min) =	-1875.1	kips
ΦPn =	37.0	kips
Φ =	0.900	
ΦMn (Resultant) =	5588.9	k-ft
at θ =	180	degrees
NA Depth =	12.17	in

Rebar Size and Specifications

	Existing	New	
Bar Size =	#8		
Override Bar Diameter =		1.0000	in
Bar Diameter =	1.0000	1.0000	in
Bar Area =	0.7900	0.7854	in^2
Effective Bar Area =	0.7900	0.7854	in^2
Number Bars =	36	6	
Spacing =	Symmetric	Asymmetric	
fy =	60	80	ksi
Es =	29000	29000	ksi
εy =	0.00207	0.00276	in/in
Tie Size =	#4		
Clear Cover to Ties =	3		in
Bar Circle =	76	71.125	in
Adjust =	0.0000	180.0000	degrees
% of Area Effective =	100.0%	100.0%	

AXIAL RATIO = 0.3% OK

MOMENT RATIO = 86.6% OK

Minimum Required Steel

Seismic Design Category =	D		
As(min) =	18.47	sq in	ACI Section 10.5
As =	33.15	sq in	
Stl Area Reduction Factor =	1.00		

MODIFICATION OF AN EXISTING 150' MONOPOLE

BU #826222; NEWTOWN/RT-25

201 SOUTH MAIN STREET
NEWTOWN, CONNECTICUT 06470
FAIRFIELD COUNTY
LAT: 41° 22' 41.32"; LONG: -73° 16' 26.94"
APP: 310988 REV. 0; WO: 1151907

PROJECT CONTACTS

STRUCTURE OWNER:
CROWN CASTLE
MOD PM: DAN VADNEY AT DAN.VADNEY@CROWNCASTLE.COM
PH: (518) 373-3510
MOD CM: JASON D'AMICO AT
JASON.D'AMICO.VENDOR@CROWNCASTLE.COM
PH: (860) 209-0104

ENGINEER OF RECORD:
PJFMOD@PJFWEB.COM

THIS PROJECT INCLUDES THE FOLLOWING ITEMS
FIELD WELDED ANCHOR BRACKETS
POST INSTALLED ANCHOR RODS

SHEET INDEX	
SHEET NUMBER	DESCRIPTION
T-1	TITLE SHEET
S-1	GENERAL NOTES
S-2	MONOPOLE PROFILE
S-3	BASE PLATE DETAILS
S-4	MISC DETAILS
S-5	MI CHECKLIST

WIND DESIGN DATA	
REFERENCE STANDARD	TIA/EIA-222-F
LOCAL CODE	2005 CONNECTICUT BUILDING CODE
BASIC WIND SPEED (FASTEST-MILE)	85 MPH
ICE THICKNESS	0.75 IN
ICE WIND SPEED	38 MPH
SERVICE WIND SPEED	50 MPH

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1121747

ATTENTION ALL CONTRACTORS, ANYTIME YOU ACCESS A CROWN SITE FOR ANY REASON YOU ARE TO CALL THE CROWN NOC UPON ARRIVAL AND DEPARTURE, DAILY AT (800) 788-7011.

PJF PAUL J. FORD & COMPANY
250 E Broad St. Ste 400 Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #826222; NEWTOWN/RT-25
NEWTOWN, CONNECTICUT

PROJECT No:	37515-3231.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	R.M.K.
CHECKED BY:	
DATE:	11-19-2015

TITLE SHEET

T-1

MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV. 3, 02/05/2015)

1. **GENERAL NOTES**

1.1. THE MONOPOLE STRUCTURE IN ITS EXISTING CONDITION DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE PROPOSED AND EXISTING LOADS FROM THE ATTACHED STRUCTURAL MODIFICATION REPORT AT THE REQUIRED MINIMUM WIND SPEEDS. DO NOT INSTALL ANY NEW LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.

1.2. THESE DRAWINGS WERE PREPARED FROM INFORMATION PROVIDED BY CROWN CASTLE. THE INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY THE ENGINEER OF RECORD (EOR) FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS. THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT DRAWINGS AND THEIR FIELD VERIFIED CONDITIONS AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO THE EOR AND CROWN CASTLE BEFORE PROCEEDING WITH THE WORK.

1.3. IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR GREATER QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.

1.4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN SUCCESSFULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO ENSURE THE SAFETY AND STABILITY OF THE MONOPOLE AND ITS COMPONENT PARTS DURING FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT.

1.5. 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/TIA-1019 (LATEST EDITION), OSHA AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/TIA-1019 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.

1.6. OBSERVATION VISITS TO THE SITE BY CROWN CASTLE AND/OR THE EOR SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES. ANY SUPPORT SERVICES PERFORMED BY THE EOR DURING CONSTRUCTION ARE SOLELY FOR THE PURPOSE OF ACHIEVING GENERAL CONFORMANCE WITH THE CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE THE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.

1.7. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY CROWN CASTLE AND EOR PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.

1.8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK AS WELL AS CROWN CASTLE SAFETY GUIDELINES.

1.9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.

1.10. ANY EXISTING ATTACHMENTS AND/OR PROJECTIONS ON THE POLE THAT MAY INTERFERE WITH THE INSTALLATION OF THE REINFORCING SYSTEM WILL HAVE TO BE REMOVED AND RELOCATED, REPLACED, OR RE-INSTALLED AS REQUIRED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH CROWN CASTLE, TESTING AGENCY, AND EOR.

1.11. ANY AND ALL EXISTING PLATFORMS THAT ARE LOCATED IN AREAS OF THE POLE SHAFT WHERE SHAFT REINFORCING MUST BE APPLIED SHALL BE TEMPORARILY REMOVED OR OTHERWISE SUPPORTED TO PERMIT NEW CONTINUOUS REINFORCEMENT TO BE ATTACHED. AFTER THE CONTRACTOR HAS SUCCESSFULLY INSTALLED THE MONOPOLE REINFORCEMENT SYSTEM, THE CONTRACTOR SHALL RE-INSTALL THE PLATFORMS.

1.12. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS APPROVAL OF THE EOR.

1.13. FOR STANDARD CROWN PARTS SEE THE MOST RECENT VERSION OF THE "CCI APPROVED REINFORCEMENT COMPONENTS" CATALOG.

1.14. ALL SOLUTIONS FOR THE REPLACEMENT, RELOCATION OR MODIFICATION OF THE SAFETY CLIMB AND/OR ANY OF THE MONOPOLE CLIMBING FACILITIES SHALL BE COORDINATED WITH TUF-TUG PRODUCTS. CONTACT DETAILS:
3434 ENCRETE LANE, MORAINE, OHIO 45439
PHONE: 937-299-1213 EMAIL: TUFTUG@AOL.COM

2. **STRUCTURAL STEEL**

2.1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:
2.1.1. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
2.1.1.1. "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS."
2.1.1.2. "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS.
2.1.1.3. "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
2.1.2. BY THE AMERICAN WELDING SOCIETY (AWS):
2.1.2.1. "STRUCTURAL WELDING CODE – STEEL D1.1."
2.1.2.2. "STANDARD SYMBOLS FOR WELDING, BRAZING, AND NONDESTRUCTIVE EXAMINATION"

2.2. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS', DEC. 31, 2009.

2.3. ANY MATERIAL OR WORKMANSHIP WHICH IS OBSERVED TO BE DEFECTIVE OR INCONSISTENT WITH THE CONTRACT DOCUMENTS SHALL BE CORRECTED, MODIFIED, OR REPLACED AT THE CONTRACTOR'S EXPENSE.

2.4. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1. ALL WELD ELECTRODES SHALL BE E80XX UNLESS NOTED OTHERWISE ON THE DRAWINGS.

2.5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO CROWN CASTLE'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

2.6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65(FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.

2.7. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION I NOTES REGARDING TOUCH UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.

2.8. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.

2.9. FIELD CUTTING OF STEEL:
2.9.1. IMPORTANT CUTTING AND WELDING SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES. PER THE 12-01-2005 CROWN CASTLE DIRECTIVE "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CROWN CASTLE POLICY 'CUTTING AND WELDING SAFETY PLAN' (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT". ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
2.9.2. ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. CONTRACTOR TO AVOID 90 DEGREE CORNERS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS.

3. **BASE PLATE GROUT - (NOT REQUIRED)**

4. **FOUNDATION WORK - (NOT REQUIRED)**

5. **CAST-IN-PLACE CONCRETE - (NOT REQUIRED)**

6. **EPOXY GROUTED REINFORCING ANCHOR RODS**

6.1. UNLESS OTHERWISE NOTED, REINFORCING ANCHOR RODS SHALL BE 150 KSI ALL-THREAD BARS CONFORMING TO ASTM A722. RECOMMENDED MANUFACTURERS/SUPPLIERS OF 150 KSI ALL-THREAD BARS ARE WILLIAMS FORM ENGINEERING CORPORATION AND DYWIDAG SYSTEMS INTERNATIONAL.

6.2. ALL REINFORCING ANCHOR RODS SHALL BE HOT DIP GALVANIZED PER ASTM A123.

6.3. THE CORE-DRILLED HOLES IN THE CONCRETE FOR THE ANCHOR RODS SHALL BE CLEAN AND DRY, AND OTHERWISE PROPERLY PREPARED ACCORDING TO THE ANCHOR ROD AND EPOXY MANUFACTURERS' INSTRUCTIONS, PRIOR TO PLACEMENT OF ANCHOR RODS AND EPOXY. CONTRACTOR SHALL FOLLOW ALL ANCHOR ROD AND EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF RODS, EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST-INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.

6.4. HILTI HIT RE-500 SD OR ITW RED HEAD EPCON G5 EPOXY SHALL BE USED TO ANCHOR THE BAR IN THE DRILL HOLES. IF THE DESIGNED EMBEDMENT IS GREATER THAN 12 FT, CONTRACTOR HAS THE OPTION TO USE PILE ANCHOR GROUT BY E-CHEM AS AN ALTERNATE. IF CONTRACTOR WISHES TO USE A DIFFERENT EPOXY, A REQUEST INCLUDING THE EPOXY TECHNICAL DATA SHEET(S) SHALL BE SUBMITTED TO THE EOR FOR REVIEW PRIOR TO CONSTRUCTION.

6.5. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN INSTALLED AND ALL EPOXY AND GROUT HAVE CURED (IF BASE PLATE AND/OR BEARING PLATES HAVE BEEN GROUTED PRIOR TO TESTING), ALL REINFORCING ANCHORS SHALL BE LOAD TESTED PER CROWN CASTLE ENGINEERING DOCUMENT #ENG-PRC-10119. REFER TO THE NEW ANCHOR & BRACKET DETAIL ON FOLLOWING SHEETS FOR SPECIFIED ANCHOR ROD TARGET TENSION LOAD.

6.6. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN SUCCESSFULLY LOAD TESTED AND APPROVED THE CONTRACTOR SHALL TIGHTEN ALL HEAVY HEX ANCHOR NUTS TO SNUG TIGHT PLUS 1/8 TURN OF NUT.

7. **TOUCH UP OF GALVANIZING**

7.1. THE CONTRACTOR SHALL TOUCH UP ANY AND ALL AREAS OF GALVANIZING ON THE EXISTING STRUCTURE OR NEW COMPONENTS THAT ARE DAMAGED OR ABRADED DURING CONSTRUCTION. GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS ANY AND ALL ABRASIONS, CUTS, FIELD DRILLING, AND ALL FIELD WELDING SHALL BE TOUCHED UP WITH TWO (2) COATS OF ZRC COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS, DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-631-3275 FOR PRODUCT INFORMATION.

7.2. CONTRACTOR SHALL CLEAN AND PREPARE ALL FIELD WELDS ON GALVANIZED AND PRIME PAINTED SURFACES FOR TOUCH-UP COATING IN ACCORDANCE WITH AWS D1.1.

7.3. CROWN CASTLE'S TESTING AGENCY SHALL VERIFY THE PREPARED SURFACE PRIOR TO APPLICATION OF THE TOUCH-UP COATING.

7.3. CROWN CASTLE'S TESTING AGENCY SHALL TEST AND VERIFY THE COATING THICKNESS AFTER THE CONTRACTOR HAS APPLIED THE ZRC COLD GALVANIZING COMPOUND AND IT HAS SUFFICIENTLY DRIED. AREAS FOUND TO BE ADEQUATELY COATED, SHALL BE RE-COATED BY THE CONTRACTOR AND RE-TESTED BY THE TESTING AGENCY.

8. **HOT-DIP GALVANIZING**

8.1. HOT-DIP GALVANIZE ALL STRUCTURAL STEEL MEMBERS AND ALL STEEL ACCESSORIES, BOLTS, WASHERS, ETC. PER ASTM A123 OR PER ASTM A153, AS APPROPRIATE.

8.2. PROPERLY PREPARE STEEL ITEMS FOR GALVANIZING. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES WITH EOR APPROVAL OF LOCATIONS.

8.3. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

9. **PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER**

9.1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY CROWN CASTLE, CROWN CASTLE WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.

9.2. ANY FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE EXISTING GALVANIZED STEEL POLE STRUCTURE AND THE WELDED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT CROWN CASTLE REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.

9.3. CROWN CASTLE SHALL REFER TO TIA/EIA-222-F-1996, SECTION 14 AND ANNEX E FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY CROWN CASTLE BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. THE EOR RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT, ACCORDING TO TIA/EIA-222-F-1996 SECTION 14.1, NOTE 1: "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

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PH: (724) 416-2000

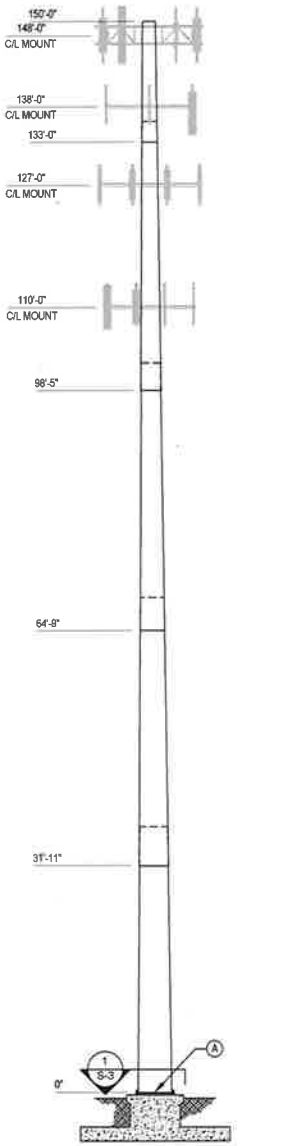
MODIFICATION OF AN EXISTING 150' MONOPOLE

BU #826222; NEWTOWN/RT-25
NEWTOWN, CONNECTICUT

PROJECT No:	37515-3231.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	R.M.K.
CHECKED BY:	
DATE:	11-19-2015

GENERAL NOTES

S-1



POLE ELEVATION 1 / S-2

SHAFT SECTION DATA							
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN) @ TOP	DIAMETER ACROSS FLATS (IN) @ BOTTOM	POLE GRADE (ksi)	POLE SHAPE
1	17.00	0.2500	35.00	21.830	26.000	65	18-SIDED
2	37.50	0.3125	46.00	24.784	34.063	65	18-SIDED
3	37.50	0.3750	56.00	32.490	41.750	65	18-SIDED
4	37.50	0.3750	66.00	39.847	49.063	65	18-SIDED
5	37.42	0.3750		46.961	56.125	65	18-SIDED
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES							

MODIFICATIONS:

(A) INSTALL NEW ANCHOR RODS AND BRACKETS AT BASE OF POLE. SEE SHEET S-3.

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MONOPOLE PROFILE

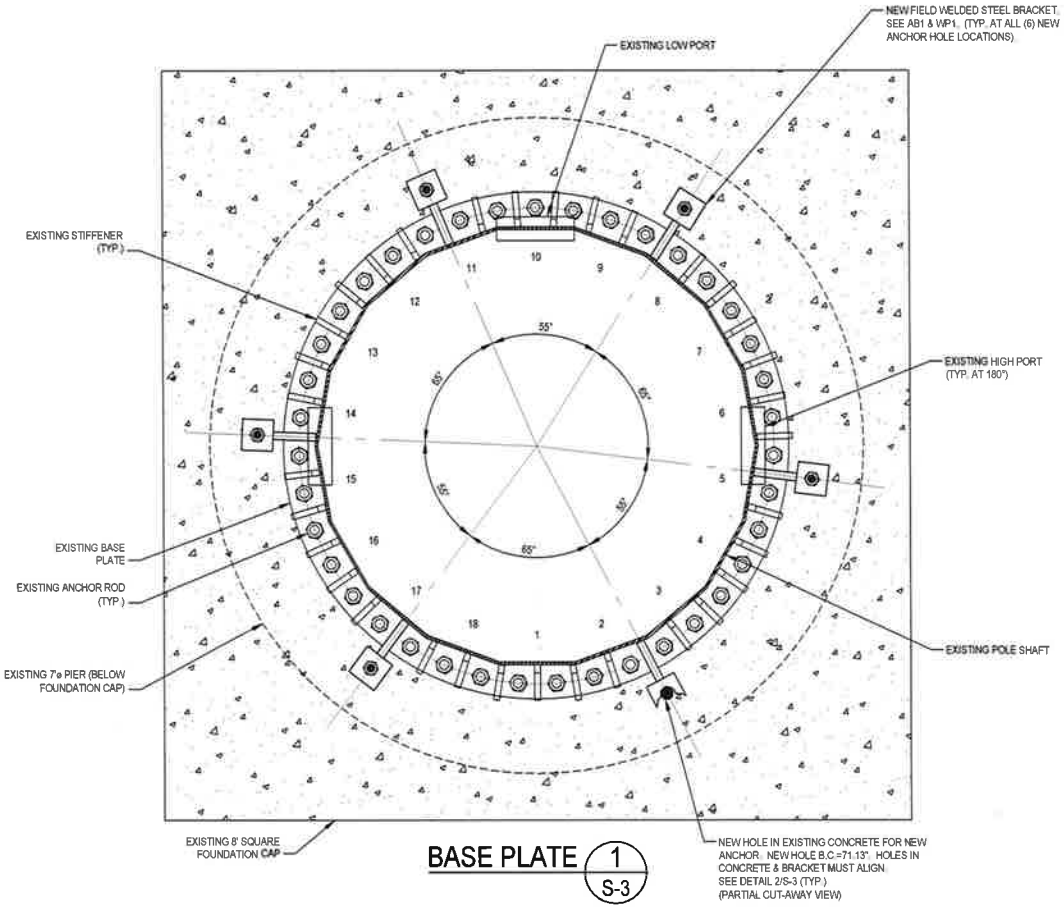
S-2

BASE SPECIFICATIONS	
BASE PLATE:	65"ø; 1 1/2" THK.; Fy=50 KSI
ANCHOR RODS:	(39) 1 1/4"ø; 61" B.C.

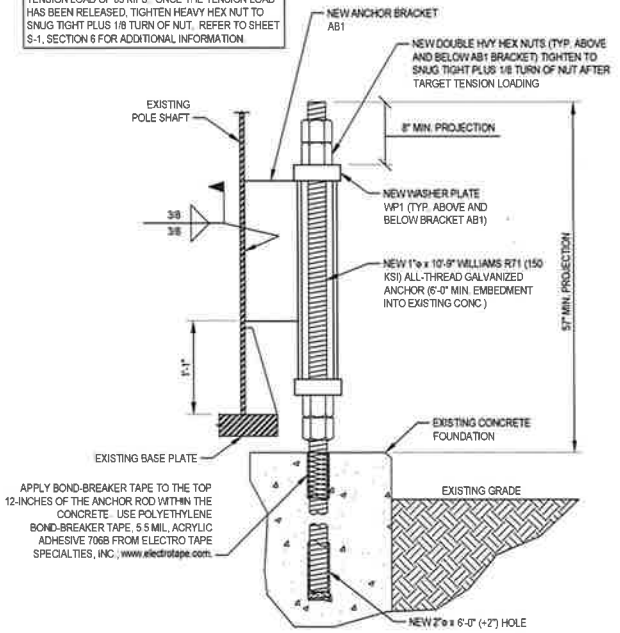
NDE OF THE CIRCUMFERENTIAL WELD OF THE BASE PLATE TO SHAFT CONNECTION IS REQUIRED. SEE CCI DOCUMENTS ENG-SOW-10033 'TOWER BASE PLATE NDE' AND ENG BUL-10051 'NDE REQUIREMENTS FOR MONOPOLE BASE PLATE TO PREVENT CONNECTION FAILURE.' NOTIFY THE EOR AND CROWN CASTLE ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING REINFORCEMENTS THAT HAVE BEEN WELDED TO THE BASE PLATE. ANY FULL PENETRATION WELDING TO THE BASE PLATE REQUIRED AS PART OF THIS ACTIVE REINFORCEMENT DESIGN SHALL BE INCLUDED IN THE NDE SCOPE OF WORK.

NEW ANCHOR RODS				
PART #	DIAMETER (IN)	LENGTH (IN)	MATERIAL	EMBEDMENT DEPTH (IN)
CUSTOM	1	129	WILLIAMS R71	72

NEW ANCHOR ROD REINFORCING SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. ONCE ALL RESIN HAS CURED, ALL NEW ANCHOR ROD REINFORCING SHALL BE TESTED TO A TARGET TENSION LOAD OF 65 KIPS. ONCE THE TENSION LOAD HAS BEEN RELEASED, TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/8 TURN OF NUT. REFER TO SHEET S-1, SECTION 6 FOR ADDITIONAL INFORMATION.



BASE PLATE 1 / S-3



NEW ANCHOR & BRACKET DETAIL 2 / S-3

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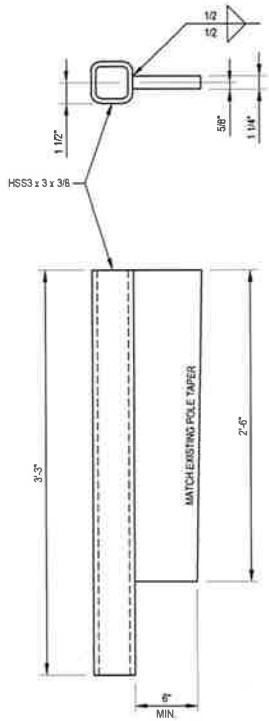
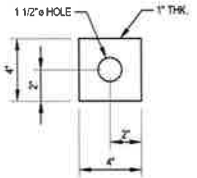
BASE PLATE DETAILS

S-3



ANCHOR BRACKET MK~AB1

(6 REQUIRED) (TUBE Fy = 46 KSI) (STIFFENER Fy = 65 KSI)



WASHER PLATE MK~WP1

(12 REQUIRED) (Fy = 50 KSI)

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BU #826222; NEWTOWN/RT-25
NEWTOWN, CONNECTICUT

PROJECT No:	37515-3231.001.7700
DRAWN BY:	BMS
DESIGNED BY:	RMK
CHECKED BY:	
DATE:	11-19-2015

MISC DETAILS

S-4

MODIFICATION INSPECTION NOTES:

1. GENERAL
   - 1.1. 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 EOR.
   - 1.2. 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.
   - 1.3. ALL MI'S SHALL BE CONDUCTED BY A CROWN CASTLE ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN CASTLE.
   - 1.4. 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. IF CONTACT INFORMATION IS NOT KNOWN, CONTACT YOUR CROWN CASTLE POINT OF CONTACT (POC).
   - 1.5. REFER TO ENG-SOW-10007: MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

2. MI INSPECTOR
   - 2.1. THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:
     - 2.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
     - 2.1.2. WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
     - 2.1.3. THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL 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 CROWN CASTLE.

3. GENERAL CONTRACTOR
   - 3.1. 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:
     - 3.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
     - 3.1.2. WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
     - 3.1.3. BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.
     - 3.1.4. THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND ENG-SOW-10007.

4. RECOMMENDATIONS
   - 4.1. THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:
     - 4.1.1. 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.
     - 4.1.2. THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
     - 4.1.3. WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
     - 4.1.4. 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.
     - 4.1.5. 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.

5. CANCELLATION OR DELAYS IN SCHEDULED MI
   - 5.1. IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN CASTLE 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 CROWN CASTLE 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.

6. CORRECTION OF FAILING MI'S
   - 6.1. IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH CROWN CASTLE TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:
     - 6.1.1. CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
     - 6.1.2. OR, WITH CROWN CASTLE'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.

7. MI VERIFICATION INSPECTIONS
   - 7.1. CROWN CASTLE RESERVES THE RIGHT TO CONDUCT A MI VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MI INSPECTION(S) ON TOWER MODIFICATION PROJECTS.
   - 7.2. ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH ENG-SOW-10007.
   - 7.3. VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT AEV/AESV FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE DATE OF AN ACCEPTED "PASSING MI" OR "PASS AS NOTED MI" REPORT FOR THE ORIGINAL PROJECT.

8. PHOTOGRAPHS
   - 8.1. BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:
     - 8.1.1. PRECONSTRUCTION GENERAL SITE CONDITION
     - 8.1.2. PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
     - 8.1.3. RAW MATERIALS
     - 8.1.4. PHOTOS OF ALL CRITICAL DETAILS
     - 8.1.5. FOUNDATION MODIFICATIONS
     - 8.1.6. WELD PREPARATION
     - 8.1.7. BOLT INSTALLATION AND TORQUE
     - 8.1.8. FINAL INSTALLED CONDITION
     - 8.1.9. SURFACE COATING REPAIR
     - 8.1.10. POST CONSTRUCTION PHOTOGRAPHS
     - 8.1.11. FINAL INFIELD CONDITION
     - 8.1.12. PHOTOS OF ELEVATED MODIFICATIONS TAKEN FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.
     - 8.1.13. THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS. PLEASE REFER TO ENG-SOW-10007.

9. INSPECTION AND TESTING
   - 9.1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY CROWN CASTLE'S REPRESENTATIVE AND CROWN CASTLE'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY.
   - 9.2. INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS ARE STILL REQUIRED WHEN THE EOR PERFORMS SUPPORT SERVICES DURING CONSTRUCTION.
   - 9.3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
   - 9.4. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED, RETAINED AND PAID FOR BY CROWN CASTLE FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.
     - 9.4.1. ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.
     - 9.4.2. THE INSPECTION AGENCY SHALL SO SCHEDULE THIS WORK AS TO CAUSE A MINIMUM OF INTERRUPTION TO, AND COORDINATE WITH, THE WORK IN PROGRESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE WORK SCHEDULE WITH THE TESTING AGENCY. THE CONTRACTOR SHALL ALLOW FOR ADEQUATE TIME AND ACCESS FOR THE TESTING AGENCY TO PERFORM THEIR DUTIES.
   - 9.5. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES AND INSPECT THE FOLLOWING ITEMS IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS. THE TESTING AGENCY SHALL INSPECT ITEMS ON THIS LIST AND OTHER ITEMS AS NECESSARY TO FULFILL THEIR RESPONSIBILITY. THE TESTING AGENCY SHALL UTILIZE EXPERIENCED, TRAINED INSPECTORS INCLUDING AWS CERTIFIED WELDING INSPECTORS (CWI). INSPECTORS SHALL HAVE THE TRAINING, CREDENTIALS, AND EXPERIENCE APPROPRIATE FOR AND COMMENSURATE WITH THE SCOPE AND TYPE OF INSPECTION WORK TO BE PERFORMED.
   - 9.6. GENERAL
     - 9.6.1. PERFORM PERIODIC ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY CROWN CASTLE AND THE EOR IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.
   - 9.7. FOUNDATIONS AND SOIL PREPARATION - (NOT REQUIRED)
   - 9.8. CONCRETE TESTING PER ACI - (NOT REQUIRED)
   - 9.9. STRUCTURAL STEEL
     - 9.9.1. CHECK STEEL ON THE JOB WITH THE PLANS.
     - 9.9.2. CHECK MILL CERTIFICATIONS. CALL FOR LABORATORY TEST REPORTS WHEN MILL CERTIFICATION IS IN QUESTION.
     - 9.9.3. CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.
     - 9.9.4. INSPECT ALL STRUCTURAL BOLTS SHALL BE FIELD INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
     - 9.9.5. INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.
     - 9.9.6. CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.
     - 9.9.7. CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.
     - 9.9.8. CHECK THAT BOLTS HAVE BEEN TIGHTENED PROPERLY.
     - 9.9.9. PRIOR TO ANY FIELD CUTTING THE CONTRACTOR SHALL MARK THE CUTOUT LINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
   - 9.10. WELDING:
     - 9.10.1. VERIFY FIELD WELDING PROCEDURES, WELDERS, AND WELDING OPERATORS, NOT DEEMED PREQUALIFIED, IN ACCORDANCE WITH AWS D1.1.
     - 9.10.2. INSPECT FIELD WELDED CONNECTIONS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED AND WITH AWS D1.1.
     - 9.10.3. APPROVE FIELD WELDING SEQUENCE.
     - 9.10.4. A PROGRAM OF THE APPROVED SEQUENCES SHALL BE SUBMITTED TO CROWN CASTLE BEFORE WELDING BEGINS. NO CHANGE IN APPROVED SEQUENCES MAY BE MADE WITHOUT PERMISSION FROM CROWN CASTLE.
     - 9.10.5. INSPECT WELDED CONNECTIONS AS FOLLOWS AND IN ACCORDANCE WITH AWS D1.1:
       - 9.10.5.1. INSPECT WELDING EQUIPMENT FOR CAPACITY, MAINTENANCE, AND WORKING CONDITIONS.
       - 9.10.5.2. VERIFY SPECIFIED ELECTRODES AND HANDLING AND STORAGE OF ELECTRODES FOR CONFORMANCE TO SPECIFICATIONS.
       - 9.10.5.3. INSPECT PREHEATING AND INTERPASS TEMPERATURES FOR CONFORMANCE WITH AWS D1.1.
       - 9.10.5.4. VISUALLY INSPECT ALL WELDS AND VERIFY THAT QUALITY OF WELDS MEETS THE REQUIREMENTS OF AWS D1.1. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT.
       - 9.10.5.5. SPOT TEST AT LEAST ONE FILLET WELD OF EACH MEMBER USING MAGNETIC PARTICLE.
       - 9.10.5.6. INSPECT FOR SIZE, SPACING, TYPE AND LOCATION AS PER APPROVED DRAWINGS.
       - 9.10.5.7. VERIFY THAT THE BASE METAL CONFORMS TO THE DRAWINGS.
       - 9.10.5.8. REVIEW THE REPORTS BY TESTING LABS.
       - 9.10.5.9. CHECK TO SEE THAT WELDS ARE CLEAN AND FREE FROM SLAG.
       - 9.10.5.10. INSPECT RUST PROTECTION OF WELDS AS PER SPECIFICATIONS.
       - 9.10.5.11. CHECK THAT DEFECTIVE WELDS ARE CLEARLY MARKED AND HAVE BEEN ADEQUATELY REPAIRED.
       - 9.10.5.12. FULL PENETRATION WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY UT IN ACCORDANCE WITH AWS D1.1.
       - 9.10.5.13. PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MP IN ACCORDANCE WITH AWS D1.1.
   - 9.11. REPORTS:
     - 9.11.1. COMPILE AND PERIODICALLY SUBMIT DAILY INSPECTION REPORTS TO CROWN CASTLE.
     - 9.11.2. THE INSPECTION PLAN OUTLINED HEREIN IS INTENDED AS A DESCRIPTION OF GENERAL AND SPECIFIC ITEMS OF CONCERN. IT IS NOT INTENDED TO BE ALL-INCLUSIVE. IT DOES NOT LIMIT THE TESTING AND INSPECTION AGENCY TO THE ITEMS LISTED. ADDITIONAL TESTING, INSPECTION, AND CHECKING MAY BE REQUIRED AND SHOULD BE ANTICIPATED. THE TESTING AGENCY SHALL USE THEIR PROFESSIONAL JUDGMENT AND KNOWLEDGE OF THE JOB SITE CONDITIONS AND THE CONTRACTOR'S PERFORMANCE TO DECIDE WHAT OTHER ITEMS REQUIRE ADDITIONAL ATTENTION. THE TESTING AGENCY'S JUDGMENT MUST PREVAIL ON ITEMS NOT SPECIFICALLY COVERED. ANY DISCREPANCIES OR PROBLEMS SHALL BE BROUGHT IMMEDIATELY TO CROWN CASTLE'S ATTENTION. RESOLUTIONS ARE NOT TO BE MADE WITHOUT CROWN CASTLE'S REVIEW AND SPECIFIC WRITTEN CONSENT. CROWN CASTLE RESERVES THE RIGHT TO DETERMINE WHETHER OR NOT A RESOLUTION IS ACCEPTABLE.
     - 9.11.3. AFTER EACH INSPECTION, THE TESTING AGENCY WILL PREPARE A WRITTEN ACCEPTANCE OR REJECTION WHICH WILL BE GIVEN TO THE CONTRACTOR AND FILED AS DAILY REPORTS TO CROWN CASTLE. THIS WRITTEN ACTION WILL GIVE THE CONTRACTOR A LIST OF ITEMS TO BE CORRECTED, PRIOR TO CONTINUING CONSTRUCTION, AND/OR LOADING OF STRUCTURAL ITEMS.
     - 9.11.4. THE TESTING AGENCY DOES NOT RELIEVE THE CONTRACTOR'S CONTRACTUAL OR STATUTORY OBLIGATIONS. THE CONTRACTOR HAS THE SOLE RESPONSIBILITY FOR ANY DEVIATIONS FROM THE OFFICIAL CONTRACT DOCUMENTS. THE TESTING AGENCY WILL NOT REPLACE THE CONTRACTOR'S QUALITY CONTROL PERSONNEL.

MI CHECKLIST

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
	PRE-CONSTRUCTION
X	MI CHECKLIST DRAWINGS
X	EOR REVIEW
X	FABRICATION INSPECTION
X	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
X	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
	CONSTRUCTION
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
X	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS:	
	POST-CONSTRUCTION
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
X	POST INSTALLED ANCHOR ROD TARGET TENSION LOAD TESTING
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

NOTE: X DENOTES A DOCUMENT NEEDED FOR THE PMI REPORT
NA DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE PMI REPORT

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250 E Broad St, Ste 400 Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 150' MONOPOLE

BU #826222; NEWTOWN/RT-25
NEWTOWN, CONNECTICUT

PROJECT No:	37515-3231.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	R.M.K.
CHECKED BY:	
DATE:	11-19-2015

MI CHECKLIST

S-5

MODIFICATION OF AN EXISTING 150' MONOPOLE

BU #826222; NEWTOWN/RT-25

201 SOUTH MAIN STREET
NEWTOWN, CONNECTICUT 06470
FAIRFIELD COUNTY
LAT: 41° 22' 41.32"; LONG: -73° 16' 26.94"
APP: 310988 REV. 0; WO: 1151907

PJF PAUL J. FORD & COMPANY
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CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (704) 416-2000

PROJECT CONTACTS

STRUCTURE OWNER:
CROWN CASTLE
MOD PM: DAN VADNEY AT DAN.VADNEY@CROWNCASTLE.COM
PH: (518) 373-3510
MOD CM: JASON D'AMICO AT
JASON.D'AMICO.VENDOR@CROWNCASTLE.COM
PH: (860) 209-0104

ENGINEER OF RECORD:
PJFMOD@PJFWEB.COM

THIS PROJECT INCLUDES THE FOLLOWING ITEMS
FIELD WELDED ANCHOR BRACKETS
POST INSTALLED ANCHOR RODS

SHEET INDEX	
SHEET NUMBER	DESCRIPTION
T-1	TITLE SHEET
S-1	GENERAL NOTES
S-2	MONOPOLE PROFILE
S-3	BASE PLATE DETAILS
S-4	MISC DETAILS
S-5	MI CHECKLIST

WIND DESIGN DATA	
REFERENCE STANDARD	TIA/EIA-222-F
LOCAL CODE	2005 CONNECTICUT BUILDING CODE
BASIC WIND SPEED (FASTEST-MILE)	85 MPH
ICE THICKNESS	0.75 IN
ICE WIND SPEED	38 MPH
SERVICE WIND SPEED	50 MPH

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1121747

ATTENTION ALL CONTRACTORS, ANYTIME YOU ACCESS A CROWN SITE FOR ANY REASON YOU ARE TO CALL THE CROWN NOC UPON ARRIVAL AND DEPARTURE, DAILY AT (800) 788-7011.

11-2015

MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #826222; NEWTOWN/RT-25
NEWTOWN, CONNECTICUT

PROJECT No:	37515-3231.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	R.M.K.
CHECKED BY:	KAT
DATE:	11-19-2015

TITLE SHEET

T-1

37515-3231.001.DWG

MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV. 3, 02/05/2015)

1. GENERAL NOTES
1.1. THE MONOPOLE STRUCTURE IN ITS EXISTING CONDITION DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE PROPOSED AND EXISTING LOADS FROM THE ATTACHED STRUCTURAL MODIFICATION REPORT AT THE REQUIRED MINIMUM WIND SPEEDS. DO NOT INSTALL ANY NEW LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.
1.2. THESE DRAWINGS WERE PREPARED FROM INFORMATION PROVIDED BY CROWN CASTLE. THE INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY THE ENGINEER OF RECORD (EOR) FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS. THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT DRAWINGS AND THEIR FIELD VERIFIED CONDITIONS AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO THE EOR AND CROWN CASTLE BEFORE PROCEEDING WITH THE WORK.
1.3. IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR GREATER QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.
1.4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN SUCCESSFULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO ENSURE THE SAFETY AND STABILITY OF THE MONOPOLE AND ITS COMPONENT PARTS DURING FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT.
1.5. 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/TIA-1019 (LATEST EDITION), OSHA AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/TIA-1019 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.
1.6. OBSERVATION VISITS TO THE SITE BY CROWN CASTLE AND/OR THE EOR SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES. ANY SUPPORT SERVICES PERFORMED BY THE EOR DURING CONSTRUCTION ARE SOLELY FOR THE PURPOSE OF ACHIEVING GENERAL CONFORMANCE WITH THE CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE THE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
1.7. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY CROWN CASTLE AND EOR PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
1.8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK AS WELL AS CROWN CASTLE SAFETY GUIDELINES.
1.9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.
1.10. ANY EXISTING ATTACHMENTS AND/OR PROJECTIONS ON THE POLE THAT MAY INTERFERE WITH THE INSTALLATION OF THE REINFORCING SYSTEM WILL HAVE TO BE REMOVED AND RELOCATED, REPLACED, OR RE-INSTALLED AS REQUIRED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH CROWN CASTLE, TESTING AGENCY, AND EOR.
1.11. ANY AND ALL EXISTING PLATFORMS THAT ARE LOCATED IN AREAS OF THE POLE SHAFT WHERE SHAFT REINFORCING MUST BE APPLIED SHALL BE TEMPORARILY REMOVED OR OTHERWISE SUPPORTED TO PERMIT NEW CONTINUOUS REINFORCEMENT TO BE ATTACHED. AFTER THE CONTRACTOR HAS SUCCESSFULLY INSTALLED THE MONOPOLE REINFORCEMENT SYSTEM, THE CONTRACTOR SHALL RE-INSTALL THE PLATFORMS.
1.12. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS APPROVAL OF THE EOR.
1.13. FOR STANDARD CROWN PARTS SEE THE MOST RECENT VERSION OF THE "CCI APPROVED REINFORCEMENT COMPONENTS" CATALOG.
1.14. ALL SOLUTIONS FOR THE REPLACEMENT, RELOCATION OR MODIFICATION OF THE SAFETY CLIMB AND/OR ANY OF THE MONOPOLE CLIMBING FACILITIES SHALL BE COORDINATED WITH TUF-TUG PRODUCTS. CONTACT DETAILS:
3434 ENCRETE LANE, MORAINE, OHIO 45439
PHONE: 937-299-1213 EMAIL: TUFTUG@AOL.COM

2. STRUCTURAL STEEL
2.1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:
2.1.1. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
2.1.1.1. "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS."
2.1.1.2. "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS.
2.1.1.3. "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
2.1.2. BY THE AMERICAN WELDING SOCIETY (AWS):
2.1.2.1. "STRUCTURAL WELDING CODE – STEEL D1.1."
2.1.2.2. "STANDARD SYMBOLS FOR WELDING, DRAZING, AND NONDESTRUCTIVE EXAMINATION"
2.2. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS", DEC. 31, 2009.
2.3. ANY MATERIAL OR WORKMANSHIP WHICH IS OBSERVED TO BE DEFECTIVE OR INCONSISTENT WITH THE CONTRACT DOCUMENTS SHALL BE CORRECTED, MODIFIED, OR REPLACED AT THE CONTRACTOR'S EXPENSE.
2.4. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1. ALL WELD ELECTRODES SHALL BE E80XX UNLESS NOTED OTHERWISE ON THE DRAWINGS.
2.5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO CROWN CASTLE'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
2.6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65(FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
2.7. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION I NOTES REGARDING TOUCH UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.
2.8. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
2.9. FIELD CUTTING OF STEEL:
2.9.1. IMPORTANT CUTTING AND WELDING SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES. PER THE 12-01-2005 CROWN CASTLE DIRECTIVE: "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CROWN CASTLE POLICY 'CUTTING AND WELDING SAFETY PLAN' (DOC # ENG-PLN-10615) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT". ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
2.9.2. ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. CONTRACTOR TO AVOID 90 DEGREE CORNERS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS.

3. BASE PLATE GROUT - (NOT REQUIRED)

4. FOUNDATION WORK - (NOT REQUIRED)

5. CAST-IN-PLACE CONCRETE - (NOT REQUIRED)

6. EPOXY GROUTED REINFORCING ANCHOR RODS
6.1. UNLESS OTHERWISE NOTED, REINFORCING ANCHOR RODS SHALL BE 150 KSI ALL-THREAD BARS CONFORMING TO ASTM A722. RECOMMENDED MANUFACTURERS/SUPPLIERS OF 150 KSI ALL-THREAD BARS ARE WILLIAMS FORM ENGINEERING CORPORATION AND DYWIDAG SYSTEMS INTERNATIONAL.
6.2. ALL REINFORCING ANCHOR RODS SHALL BE HOT DIP GALVANIZED PER ASTM A123.
6.3. THE CORE-DRILLED HOLES IN THE CONCRETE FOR THE ANCHOR RODS SHALL BE CLEAN AND DRY, AND OTHERWISE PROPERLY PREPARED ACCORDING TO THE ANCHOR ROD AND EPOXY MANUFACTURERS' INSTRUCTIONS, PRIOR TO PLACEMENT OF ANCHOR RODS AND EPOXY. CONTRACTOR SHALL FOLLOW ALL ANCHOR ROD AND EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF RODS, EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST-INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.
6.4. HILTI HIT RE-500 SD OR ITW RED HEAD EPCON G5 EPOXY SHALL BE USED TO ANCHOR THE BAR IN THE DRILL HOLES. IF THE DESIGNED EMBEDMENT IS GREATER THAN 12 FT, CONTRACTOR HAS THE OPTION TO USE PILE ANCHOR GROUT BY E-CHEM AS AN ALTERNATE. IF CONTRACTOR WISHES TO USE A DIFFERENT EPOXY, A REQUEST INCLUDING THE EPOXY TECHNICAL DATA SHEET(S) SHALL BE SUBMITTED TO THE EOR FOR REVIEW PRIOR TO CONSTRUCTION.
6.5. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN INSTALLED AND ALL EPOXY AND GROUT HAVE CURED (IF BASE PLATE AND/OR BEARING PLATES HAVE BEEN GROUTED PRIOR TO TESTING), ALL REINFORCING ANCHORS SHALL BE LOAD TESTED PER CROWN CASTLE ENGINEERING DOCUMENT #ENG-PRC-10119. REFER TO THE NEW ANCHOR & BRACKET DETAIL ON FOLLOWING SHEETS FOR SPECIFIED ANCHOR ROD TARGET TENSION LOAD.
6.6. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN SUCCESSFULLY LOAD TESTED AND APPROVED THE CONTRACTOR SHALL TIGHTEN ALL HEAVY HEX ANCHOR NUTS TO SNUG TIGHT PLUS 1/8 TURN OF NUT.

7. TOUCH UP OF GALVANIZING
7.1. THE CONTRACTOR SHALL TOUCH UP ANY AND ALL AREAS OF GALVANIZING ON THE EXISTING STRUCTURE OR NEW COMPONENTS THAT ARE DAMAGED OR ABRADED DURING CONSTRUCTION. GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS ANY AND ALL ABRASIONS, CUTS, FIELD DRILLING, AND ALL FIELD WELDING SHALL BE TOUCHED UP WITH TWO (2) COATS OF ZRC COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
7.2. CONTRACTOR SHALL CLEAN AND PREPARE ALL FIELD WELDS ON GALVANIZED AND PRIME PAINTED SURFACES FOR TOUCH-UP COATING IN ACCORDANCE WITH AWS D1.1. CROWN CASTLE'S TESTING AGENCY SHALL VERIFY THE PREPARED SURFACE PRIOR TO APPLICATION OF THE TOUCH-UP COATING.
7.3. CROWN CASTLE'S TESTING AGENCY SHALL TEST AND VERIFY THE COATING THICKNESS AFTER THE CONTRACTOR HAS APPLIED THE ZRC COLD GALVANIZING COMPOUND AND IT HAS SUFFICIENTLY DRIED. AREAS FOUND TO BE ADEQUATELY COATED, SHALL BE RE-COATED BY THE CONTRACTOR AND RE-TESTED BY THE TESTING AGENCY.

8. HOT-DIP GALVANIZING
8.1. HOT-DIP GALVANIZE ALL STRUCTURAL STEEL MEMBERS AND ALL STEEL ACCESSORIES, BOLTS, WASHERS, ETC. PER ASTM A123 OR PER ASTM A153, AS APPROPRIATE.
8.2. PROPERLY PREPARE STEEL ITEMS FOR GALVANIZING. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES WITH EOR APPROVAL OF LOCATIONS.
8.3. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

9. PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER
9.1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY CROWN CASTLE, CROWN CASTLE WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.
9.2. ANY FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE EXISTING GALVANIZED STEEL POLE STRUCTURE AND THE WELDED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT CROWN CASTLE REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.
9.3. CROWN CASTLE SHALL REFER TO TIA/EIA-222-F-1996, SECTION 14 AND ANNEX E FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY CROWN CASTLE BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. THE EOR RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT, ACCORDING TO TIA/EIA-222-F-1996 SECTION 14.1, NOTE 1: "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER
11-20-15

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3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (704) 418-2000

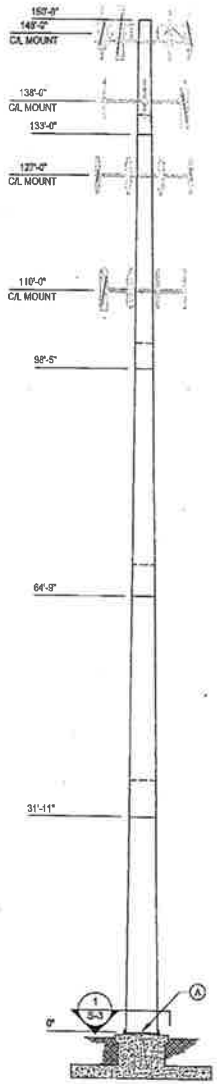
MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #826222; NEWTOWN/RT-25
NEWTOWN, CONNECTICUT

PROJECT No:	37515-3231.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	R.M.K.
CHECKED BY:	
DATE:	11-19-2015

GENERAL NOTES

S-1

37515-3231.001.DWG



POLE ELEVATION 1 / S-2

SHAFT SECTION DATA							
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN) @ TOP	DIAMETER ACROSS FLATS (IN) @ BOTTOM	POLE GRADE (ksi)	POLE SHAPE
1	17.00	0.2500	35.00	21.330	28.000	65	18-SIDED
2	37.50	0.3125	46.00	24.784	34.063	65	18-SIDED
3	37.50	0.3750	56.00	32.498	41.730	65	18-SIDED
4	37.50	0.3750	66.00	39.847	49.063	65	18-SIDED
5	37.42	0.3750	66.00	48.991	58.126	65	18-SIDED

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

MODIFICATIONS:

(A) INSTALL NEW ANCHOR RODS AND BRACKETS AT BASE OF POLE. SEE SHEET S-3.

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MODIFICATION OF AN EXISTING 150' MONOPOLE

BU #826222; NEWTOWN/RT-25
NEWTOWN, CONNECTICUT

PROJECT No:	37515-3231.001.7700
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DESIGNED BY:	R.M.K.
CHECKED BY:	DH
DATE:	11-19-2015

MONOPOLE PROFILE

S-2

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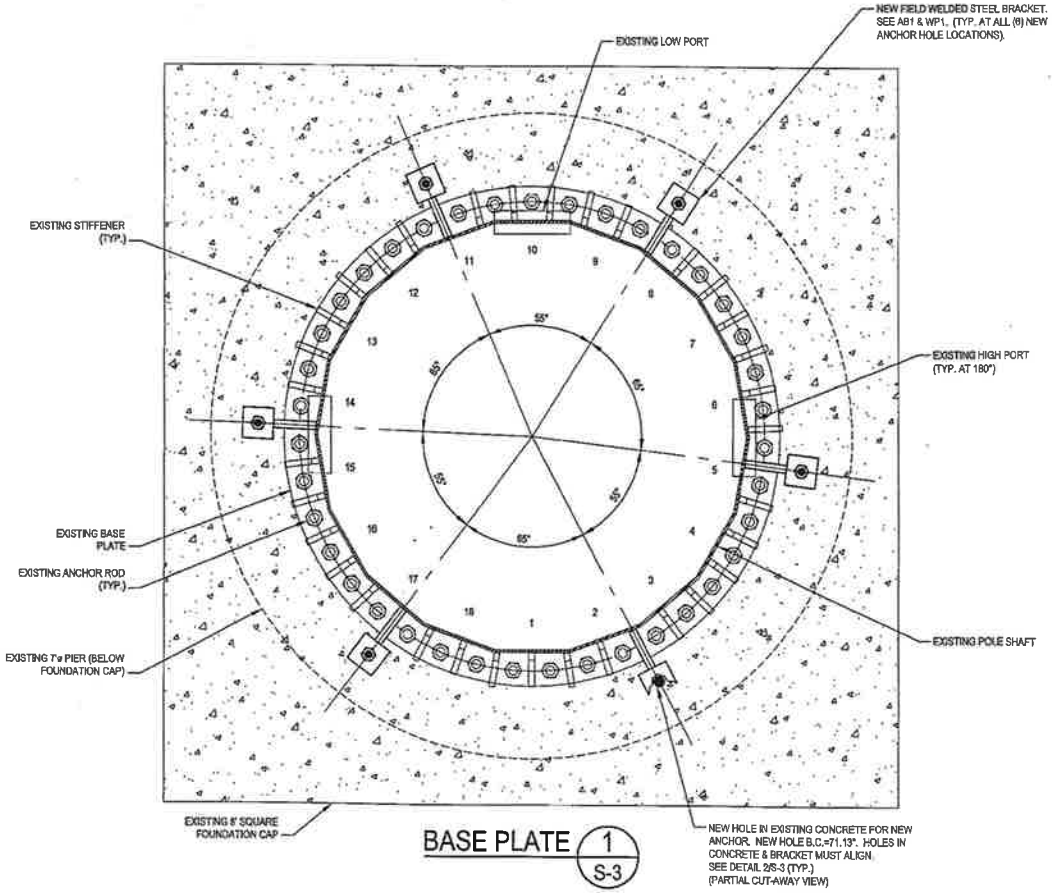
BASE SPECIFICATIONS	
BASE PLATE:	65"ø; 1 1/2" THK.; Fy=50 KSI
ANCHOR RODS:	(36) 1 1/4"ø; 61" B.C.

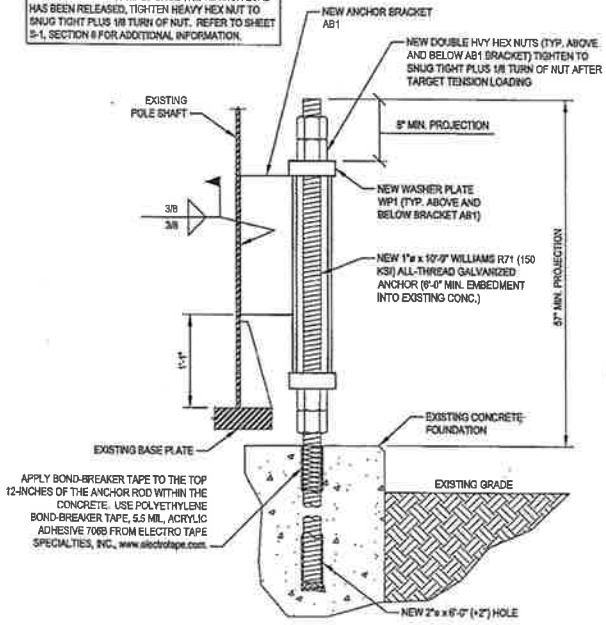
NDE OF THE CIRCUMFERENTIAL WELD OF THE BASE PLATE TO SHAFT CONNECTION IS REQUIRED. SEE CCI DOCUMENTS ENG-SOW-10033 'TOWER BASE PLATE NDE' AND ENG BUL-10051 "NDE REQUIREMENTS FOR MONOPOLE BASE PLATE TO PREVENT CONNECTION FAILURE." NOTIFY THE EOR AND CROWN CASTLE ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING REINFORCEMENTS THAT HAVE BEEN WELDED TO THE BASE PLATE. ANY FULL PENETRATION WELDING TO THE BASE PLATE REQUIRED AS PART OF THIS ACTIVE REINFORCEMENT DESIGN SHALL BE INCLUDED IN THE NDE SCOPE OF WORK.



BASE PLATE 1 S-3

NEW ANCHOR RODS				
PART #	DIAMETER (IN)	LENGTH (IN)	MATERIAL	EMBEDMENT DEPTH (IN)
CUSTOM	1	129	WILLIAMS R71	72

NEW ANCHOR ROD REINFORCING SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. ONCE ALL RESIN HAS CURED, ALL NEW ANCHOR ROD REINFORCING SHALL BE TESTED TO A TARGET TENSION LOAD OF 65 KIPS. ONCE THE TENSION LOAD HAS BEEN RELEASED, TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/8 TURN OF NUT. REFER TO SHEET S-1, SECTION 6 FOR ADDITIONAL INFORMATION.



NEW ANCHOR & BRACKET DETAIL 2 S-3

11-20-15

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MODIFICATION OF AN EXISTING 150' MONOPOLE

BU #826222; NEWTOWN/RT-25
NEWTOWN, CONNECTICUT

PROJECT No:	37515-3231.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	R.M.K.
CHECKED BY:	
DATE:	11-13-2015

BASE PLATE DETAILS

S-3

37515-3231.001.DWG

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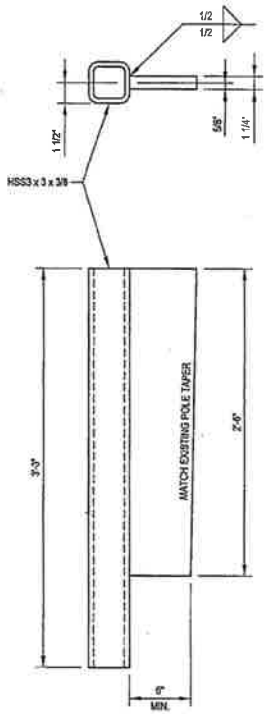
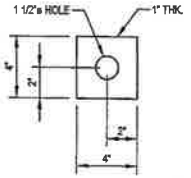


ANCHOR BRACKET MK~AB1
(6 REQUIRED) (TUBE Fy = 46 KSI) (STIFFENER Fy = 65 KSI)



WASHER PLATE MK~WP1
(12 REQUIRED) (Fy = 50 KSI)

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NEWTOWN, CONNECTICUT

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MISC DETAILS

S-4

37515-3231.001.DWG

MODIFICATION INSPECTION NOTES:

1. GENERAL
   1.1. 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 EOR.
   1.2. 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.
   1.3. ALL MI'S SHALL BE CONDUCTED BY A CROWN CASTLE ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN CASTLE.
   1.4. 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. IF CONTACT INFORMATION IS NOT KNOWN, CONTACT YOUR CROWN CASTLE POINT OF CONTACT (POC).
   1.5. REFER TO ENG-SOW-10007: MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

2. MI INSPECTOR
   2.1. THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:
      2.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
      2.1.2. WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
      2.1.3. THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL 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 CROWN CASTLE.

3. GENERAL CONTRACTOR
   3.1. 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:
      3.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
      3.1.2. WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
      3.1.3. BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.
      3.1.4. THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND ENG-SOW-10007.

4. RECOMMENDATIONS
   4.1. THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:
      4.1.1. 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.
      4.1.2. THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
      4.1.3. WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
      4.1.4. 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.
      4.1.5. 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.

5. CANCELLATION OR DELAYS IN SCHEDULED MI
   5.1. IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN CASTLE 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 CROWN CASTLE 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.

6. CORRECTION OF FAILING MI'S
   6.1. IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH CROWN CASTLE TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:
      6.1.1. CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
      6.1.2. OR, WITH CROWN CASTLE'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.

7. MI VERIFICATION INSPECTIONS
   7.1. CROWN CASTLE RESERVES THE RIGHT TO CONDUCT A MI VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MI INSPECTION(S) ON TOWER MODIFICATION PROJECTS.
   7.2. ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH ENG-SOW-10007.
   7.3. VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT AEV/AESV FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE DATE OF AN ACCEPTED "PASSING MI" OR "PASS AS NOTED MI" REPORT FOR THE ORIGINAL PROJECT.

8. PHOTOGRAPHS
   8.1. BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:
      8.1.1. PRECONSTRUCTION GENERAL SITE CONDITION
      8.1.2. PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
      8.1.3. RAW MATERIALS
      8.1.4. PHOTOS OF ALL CRITICAL DETAILS
      8.1.5. FOUNDATION MODIFICATIONS
      8.1.6. WELD PREPARATION
      8.1.7. BOLT INSTALLATION AND TORQUE
      8.1.8. FINAL INSTALLED CONDITION
      8.1.9. SURFACE COATING REPAIR
      8.1.10. POST CONSTRUCTION PHOTOGRAPHS
      8.1.11. FINAL INFIELD CONDITION
      8.1.12. PHOTOS OF ELEVATED MODIFICATIONS TAKEN FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.
      8.1.13. THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO ENG-SOW-10007.

9. INSPECTION AND TESTING
   9.1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY CROWN CASTLE'S REPRESENTATIVE AND CROWN CASTLE'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY.
   9.2. INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS ARE STILL REQUIRED WHEN THE EOR PERFORMS SUPPORT SERVICES DURING CONSTRUCTION.
   9.3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
   9.4. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED, RETAINED AND PAID FOR BY CROWN CASTLE FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.
      9.4.1. ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.
      9.4.2. THE INSPECTION AGENCY SHALL SO SCHEDULE THIS WORK AS TO CAUSE A MINIMUM OF INTERRUPTION TO, AND COORDINATE WITH, THE WORK IN PROGRESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE WORK SCHEDULE WITH THE TESTING AGENCY. THE CONTRACTOR SHALL ALLOW FOR ADEQUATE TIME AND ACCESS FOR THE TESTING AGENCY TO PERFORM THEIR DUTIES.
   9.5. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES AND INSPECT THE FOLLOWING ITEMS IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS. THE TESTING AGENCY SHALL INSPECT ITEMS ON THIS LIST AND OTHER ITEMS AS NECESSARY TO FULFILL THEIR RESPONSIBILITY. THE TESTING AGENCY SHALL UTILIZE EXPERIENCED, TRAINED INSPECTORS INCLUDING AWS CERTIFIED WELDING INSPECTORS (CWI). INSPECTORS SHALL HAVE THE TRAINING, CREDENTIALS, AND EXPERIENCE APPROPRIATE FOR AND COMMENSURATE WITH THE SCOPE AND TYPE OF INSPECTION WORK TO BE PERFORMED.
   9.6. GENERAL
      9.6.1. PERFORM PERIODIC ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY CROWN CASTLE AND THE EOR IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.
   9.7. FOUNDATIONS AND SOIL PREPARATION - (NOT REQUIRED)
   9.8. CONCRETE TESTING PER ACI - (NOT REQUIRED)
   9.9. STRUCTURAL STEEL
      9.9.1. CHECK STEEL ON THE JOB WITH THE PLANS.
      9.9.2. CHECK MILL CERTIFICATIONS. CALL FOR LABORATORY TEST REPORTS WHEN MILL CERTIFICATION IS IN QUESTION.
      9.9.3. CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.
      9.9.4. INSPECT ALL STRUCTURAL BOLTS SHALL BE FIELD INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS, DEC. 31, 2009.
      9.9.5. INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.
      9.9.6. CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.
      9.9.7. CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.
      9.9.8. CHECK THAT BOLTS HAVE BEEN TIGHTENED PROPERLY.
      9.9.9. PRIOR TO ANY FIELD CUTTING THE CONTRACTOR SHALL MARK THE CUTOUT LINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
   9.10. WELDING:
      9.10.1. VERIFY FIELD WELDING PROCEDURES, WELDERS, AND WELDING OPERATORS, NOT DEEMED PREQUALIFIED, IN ACCORDANCE WITH AWS D1.1.
      9.10.2. INSPECT FIELD WELDED CONNECTIONS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED AND WITH AWS D1.1.
      9.10.3. APPROVE FIELD WELDING SEQUENCE.
      9.10.4. A PROGRAM OF THE APPROVED SEQUENCES SHALL BE SUBMITTED TO CROWN CASTLE BEFORE WELDING BEGINS. NO CHANGE IN APPROVED SEQUENCES MAY BE MADE WITHOUT PERMISSION FROM CROWN CASTLE.
      9.10.5. INSPECT WELDED CONNECTIONS AS FOLLOWS AND IN ACCORDANCE WITH AWS D1.1:
         9.10.5.1. INSPECT WELDING EQUIPMENT FOR CAPACITY, MAINTENANCE, AND WORKING CONDITIONS.
         9.10.5.2. VERIFY SPECIFIED ELECTRODES AND HANDLING AND STORAGE OF ELECTRODES FOR CONFORMANCE TO SPECIFICATIONS.
         9.10.5.3. INSPECT PREHEATING AND INTERPASS TEMPERATURES FOR CONFORMANCE WITH AWS D1.1.
         9.10.5.4. VISUALLY INSPECT ALL WELDS AND VERIFY THAT QUALITY OF WELDS MEETS THE REQUIREMENTS OF AWS D1.1. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT.
         9.10.5.5. SPOT TEST AT LEAST ONE FILLET WELD OF EACH MEMBER USING MAGNETIC PARTICLE.
         9.10.5.6. INSPECT FOR SIZE, SPACING, TYPE AND LOCATION AS PER APPROVED DRAWINGS.
         9.10.5.7. VERIFY THAT THE BASE METAL CONFORMS TO THE DRAWINGS.
         9.10.5.8. REVIEW THE REPORTS BY TESTING LABS.
         9.10.5.9. CHECK TO SEE THAT WELDS ARE CLEAN AND FREE FROM SLAG.
         9.10.5.10. INSPECT RUST PROTECTION OF WELDS AS PER SPECIFICATIONS.
         9.10.5.11. CHECK THAT DEFECTIVE WELDS ARE CLEARLY MARKED AND HAVE BEEN ADEQUATELY REPAIRED.
         9.10.5.12. FULL PENETRATION WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY UT IN ACCORDANCE WITH AWS D1.1.
         9.10.5.13. PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MP IN ACCORDANCE WITH AWS D1.1.
   9.11. REPORTS:
      9.11.1. COMPILE AND PERIODICALLY SUBMIT DAILY INSPECTION REPORTS TO CROWN CASTLE.
      9.11.2. THE INSPECTION PLAN OUTLINED HEREIN IS INTENDED AS A DESCRIPTION OF GENERAL AND SPECIFIC ITEMS OF CONCERN. IT IS NOT INTENDED TO BE ALL-INCLUSIVE. IT DOES NOT LIMIT THE TESTING AND INSPECTION AGENCY TO THE ITEMS LISTED. ADDITIONAL TESTING, INSPECTION, AND CHECKING MAY BE REQUIRED AND SHOULD BE ANTICIPATED. THE TESTING AGENCY SHALL USE THEIR PROFESSIONAL JUDGMENT AND KNOWLEDGE OF THE JOB SITE CONDITIONS AND THE CONTRACTOR'S PERFORMANCE TO DECIDE WHAT OTHER ITEMS REQUIRE ADDITIONAL ATTENTION. THE TESTING AGENCY'S JUDGMENT MUST PREVAIL ON ITEMS NOT SPECIFICALLY COVERED. ANY DISCREPANCIES OR PROBLEMS SHALL BE BROUGHT IMMEDIATELY TO CROWN CASTLE'S ATTENTION. RESOLUTIONS ARE NOT TO BE MADE WITHOUT CROWN CASTLE'S REVIEW AND SPECIFIC WRITTEN CONSENT. CROWN CASTLE RESERVES THE RIGHT TO DETERMINE WHETHER OR NOT A RESOLUTION IS ACCEPTABLE.
      9.11.3. AFTER EACH INSPECTION, THE TESTING AGENCY WILL PREPARE A WRITTEN ACCEPTANCE OR REJECTION WHICH WILL BE GIVEN TO THE CONTRACTOR AND FILED AS DAILY REPORTS TO CROWN CASTLE. THIS WRITTEN ACTION WILL GIVE THE CONTRACTOR A LIST OF ITEMS TO BE CORRECTED, PRIOR TO CONTINUING CONSTRUCTION, AND/OR LOADING OF STRUCTURAL ITEMS.
      9.11.4. THE TESTING AGENCY DOES NOT RELIEVE THE CONTRACTOR'S CONTRACTUAL OR STATUTORY OBLIGATIONS. THE CONTRACTOR HAS THE SOLE RESPONSIBILITY FOR ANY DEVIATIONS FROM THE OFFICIAL CONTRACT DOCUMENTS. THE TESTING AGENCY WILL NOT REPLACE THE CONTRACTOR'S QUALITY CONTROL PERSONNEL.

MI CHECKLIST	
CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
	PRE-CONSTRUCTION
X	MI CHECKLIST DRAWINGS
X	EOR REVIEW
X	FABRICATION INSPECTION
X	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
X	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
	CONSTRUCTION
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
X	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS:	
	POST-CONSTRUCTION
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
X	POST INSTALLED ANCHOR ROD TARGET TENSION LOAD TESTING
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

NOTE: X DENOTES A DOCUMENT NEEDED FOR THE PMI REPORT
NA DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE PMI REPORT

11-20-15

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CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (704) 416-2000

MODIFICATION OF AN EXISTING 150' MONOPOLE

BU #826222; NEWTOWN/RT-25
NEWTOWN, CONNECTICUT

PROJECT No:	37515-3231.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	R.M.K.
CHECKED BY:	
DATE:	11-19-2015

MI CHECKLIST

S-5

37515-3231.001.DWG

	General	Power	Density					
Site Name: Branford Short Beach								
Tower Height: 119Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	1	500	120	0.0138	880	0.5867	0.24%	
*AT&T UMTS	1	500	120	0.0138	1900	1.0000	0.14%	
*AT&T GSM	3	296	120	0.0246	880	0.5867	0.42%	
*AT&T GSM	1	427	120	0.0118	1900	1.0000	0.12%	
*AT&T LTE	1	500	120	0.0138	734	0.4893	0.28%	
Verizon PCS	**1**	**2349**	**100**	**0.0845**	**1970**	**1.0000**	**8.45%**	
Verizon Cellular	**9**	**416**	**100**	**0.1346**	**869**	**0.5793**	**23.24%**	
Verizon AWS	**1**	**2306**	**100**	**0.0829**	**2145**	**1.0000**	**8.29%**	
Verizon 700	**1**	**1328**	**100**	**0.0478**	**746**	**0.4973**	**9.60%**	
								50.77%
* Source: Siting Council								