Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts

March 17, 2015

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

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

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 86-foot level on the existing 118-foot tower at 115 North Mountain Road in New Britain, Connecticut (the "Property"). The tower is owned by Crown Castle. The Council approved Cellco's shared use of this tower in 2008. Cellco now intends to modify its facility by replacing ten (10) of its existing antennas with one (1) model BXA-70040-6CF, 700 MHz antenna; one (1) model BXA-70040-6CF, 850 MHz antenna; two (2) model BXA-70063-6CF, 850 MHz antennas; three (3) model HBXX-6517DS-VTM, 1900 MHz antennas; and three (3) model HBXX-6517DS-VTM, 2100 MHz antennas, all at the same 86-foot level on the tower. Cellco also intends to install six (6) remote radio heads ("RRHs") behind its 1900 MHz and 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable attached to the outside of the tower. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Erin Stewart, Mayor for the City of New Britain. A copy of this letter is also being sent to October 24 Inc., the owner of the Property.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be installed on its existing antenna platform at the 86-foot level on the 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 replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for each of Cellco's operating frequencies are included behind Attachment 2. The Far Field calculations demonstrate that Cellco's modified facility will operate well within the RF emissions safety limits established by the FCC.

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Erin Stewart, New Britain Mayor
October 24 Inc.
Timothy Parks

ATTACHMENT 1

Amphenol ANTENNA SOLUTIONS

BXA-70040-6CF-EDIN-X

X-Pol | FET Panel | 40° | 16.0 dBd

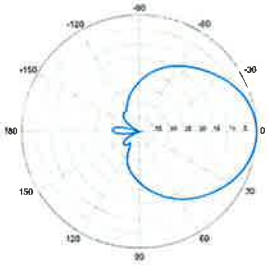
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	42°	40°
Vertical beamwidth	12°	10°
Gain	15.5 dBd (17.6 dBi)	16.0 dBd (18.1 dBi)
Electrical downtilt (X)	0, 2, 4, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-12.1 dB	-13.4 dB
Front-to-back ratio (+/-30°)	-35.8 dB	-38.0 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1806 x 606 x 200 mm	71.1 x 23.9 x 7.9 in
Depth with z-brackets	240 mm	9.4 in
Weight without mounting brackets	17 kg	38 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 1.09 m^2 Side: 0.36 m^2	Front: 11.8 ft^2 Side: 3.9 ft^2
Wind load @ 161 km/hr (100 mph)	Front:1564 N Side: 547 N	Front: 350 lbf Side: 123 lbf

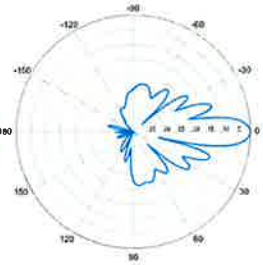
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	This model cannot be used in a standard FP concealment configuration		

BXA-70040-6CF-EDIN-X



Horizontal | 750 MHz

BXA-70040-6CF-EDIN-0



0° | Vertical | 750 MHz

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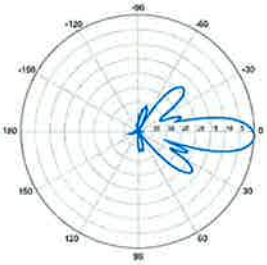
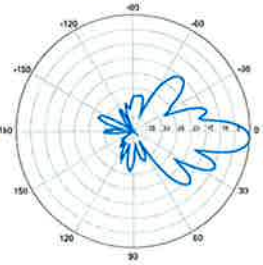


2° | Vertical | 750 MHz

BXA-70040-6CF-EDIN-4



4° | Vertical | 750 MHz

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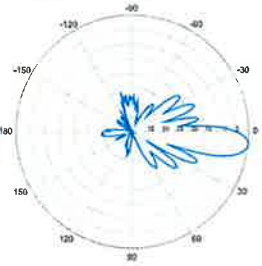
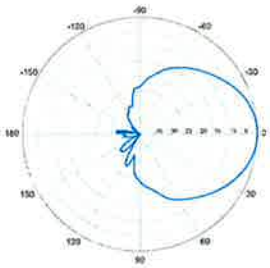
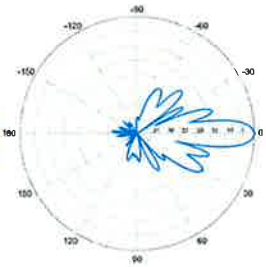


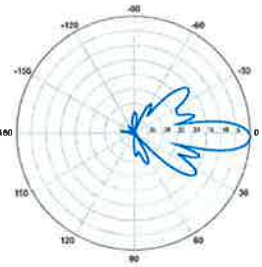
6° | Vertical | 750 MHz



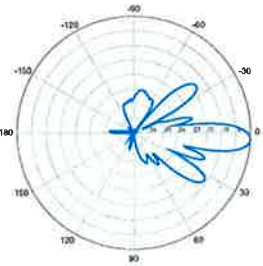
Horizontal | 850 MHz



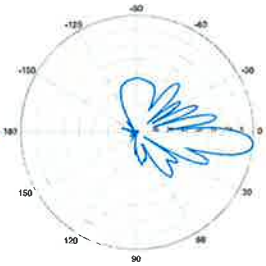
0° | Vertical | 850 MHz



2° | Vertical | 850 MHz



4° | Vertical | 850 MHz

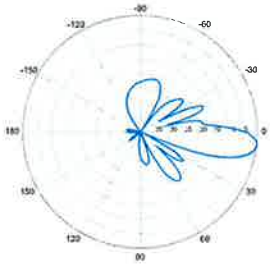


6° | Vertical | 850 MHz

BXA-70040-6CF-EDIN-X

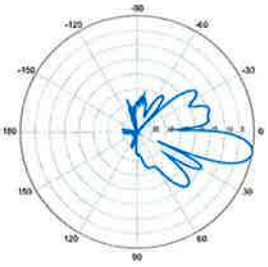
X-Pol | FET Panel | 40° | 16.0 dBd

BXA-70040-6CF-EDIN-8

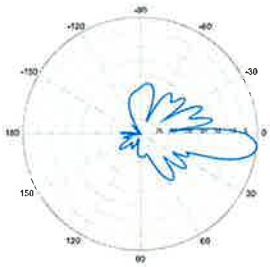


8° | Vertical | 750 MHz

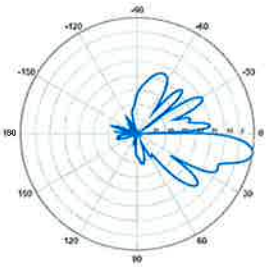
BXA-70040-6CF-EDIN-10



10° | Vertical | 750 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

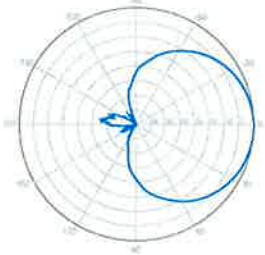
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
IM3 (2x20W carriers)	< -153 dBc	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m^2 Side: 0.24 m^2	Front: 5.5 ft^2 Side: 2.6 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

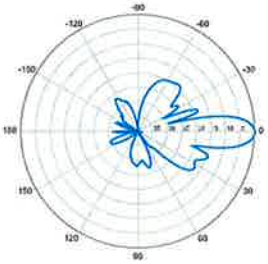
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



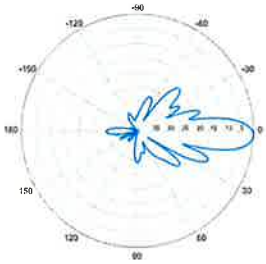
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

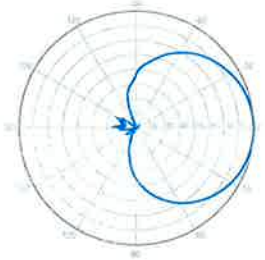


0° | Vertical | 750 MHz

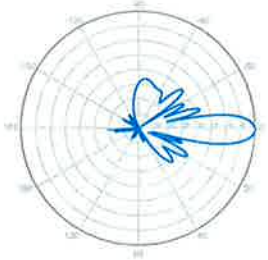
BXA-70063-6CF-EDIN-2



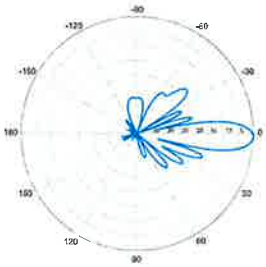
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



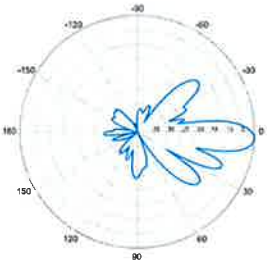
2° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

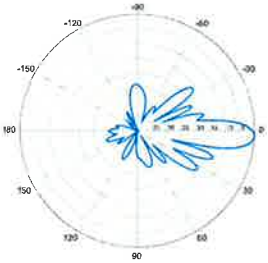
BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3

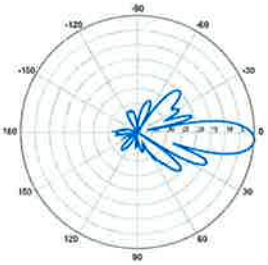


3° | Vertical | 750 MHz

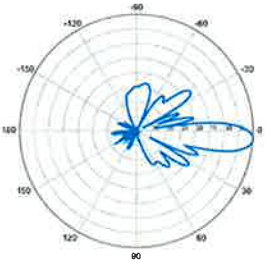


3° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-4

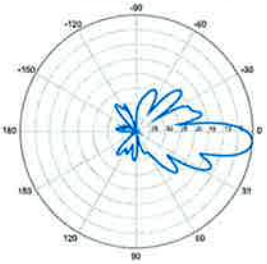


4° | Vertical | 750 MHz

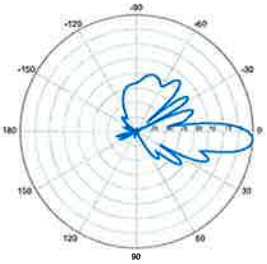


4° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-5

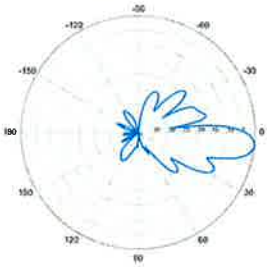


5° | Vertical | 750 MHz

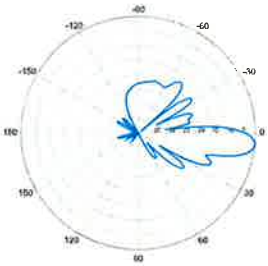


5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6

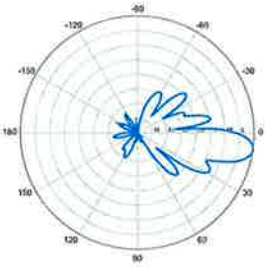


6° | Vertical | 750 MHz

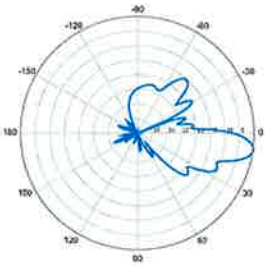


6° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-8

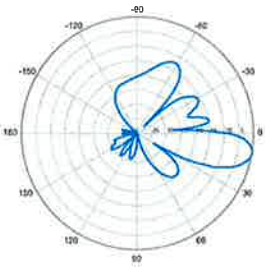


8° | Vertical | 750 MHz

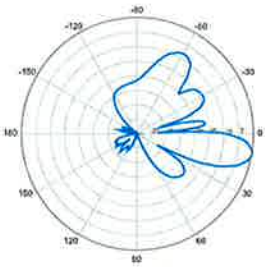


8° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-10



10° | Vertical | 750 MHz



10° | Vertical | 850 MHz

Product Specifications

COMMSCOPE®

HBXX-6517DS-VTM

Andrew® Quad Port Teletilt® Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY ANDREW

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4 3 ° | 18.7 6 ° | 18.4	0 ° | 18.4 3 ° | 18.7 6 ° | 18.5	0 ° | 18.7 3 ° | 18.9 6 ° | 18.6
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°

**Values calculated using NGMN Alliance N-P-BASTA v9.6*

Mechanical Specifications

Color | Radome Material	Light gray | PVC, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1903.0 mm x 305.0 mm x 166.0 mm | 74.9 in x 12.0 in x 6.5 in
Net Weight	19.5 kg | 43.0 lb
Model with factory installed AISG 2.0 RET	HBXX-6517DS-A2M

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	2 Branch RX – LA6.0.1
	1900A HW version	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)

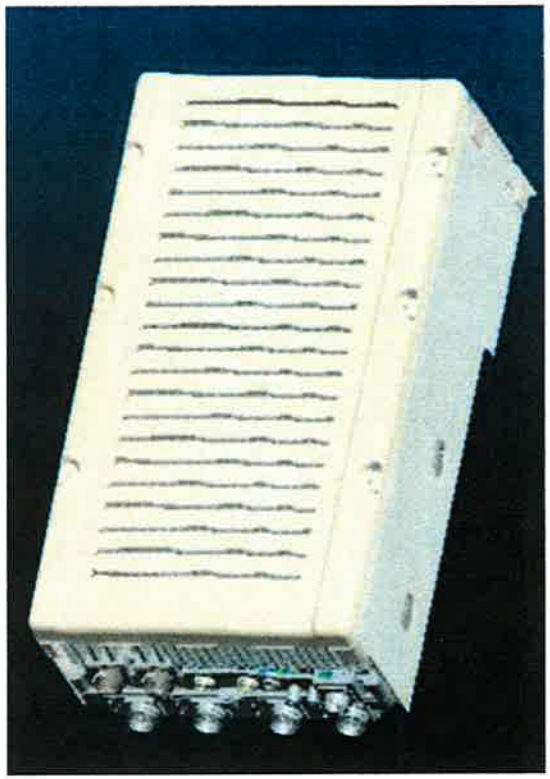
** Not a Verizon Wireless deployed product

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

ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2x60-AWS FOR BAND 4 APPLICATIONS

The Alcatel-Lucent RRH2x60-AWS is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.

A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent RRH2x60-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR PERFORMANCE

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-AWS is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

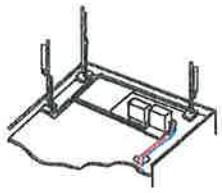
EASY INSTALLATION

The RRH2x60-AWS includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

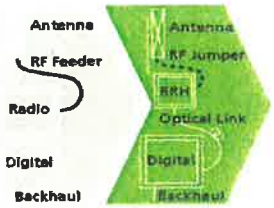
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

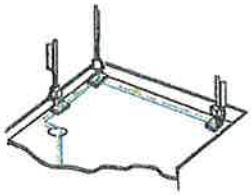
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights
- HxWxD : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data
- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

RF Characteristics
- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity
- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications
- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data
- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

AT THE SPEED OF IDEAS™

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)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

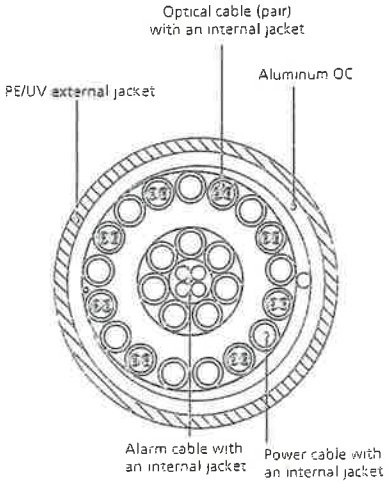


Figure 2: Construction Detail

- This data is provisional and subject to change

ATTACHMENT 2

Far Field Approximation
with downtilt variation

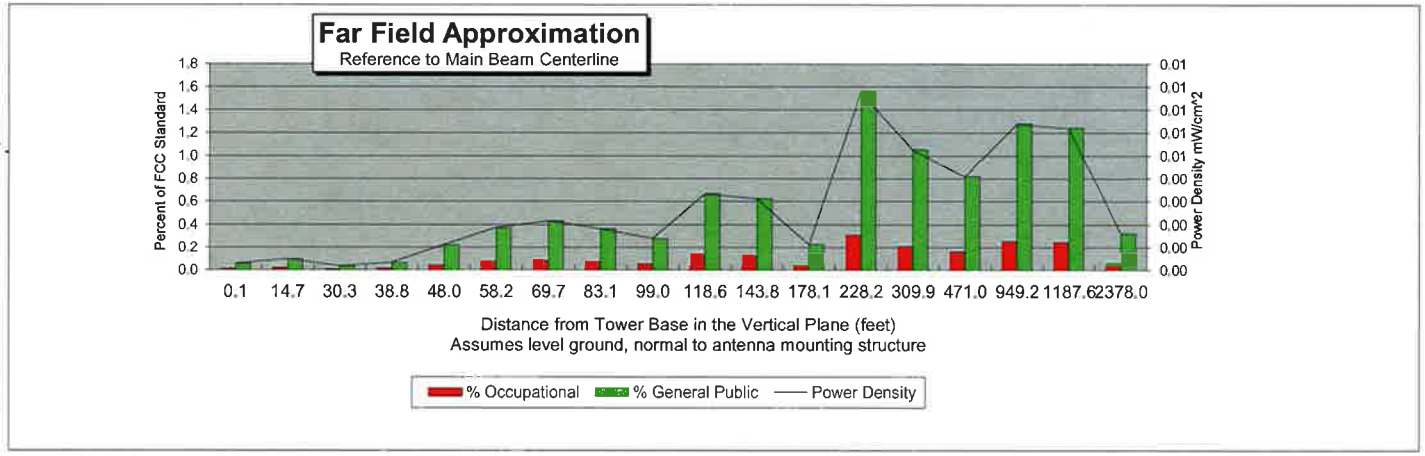
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	East Haven Cosey Beach, CT
Site #:	
Date:	03/12/15
Name:	Mark Brauer
File Name:	East Haven Cosey Beach, CT

Operating Freq. (MHz)	746.0
Antenna Height (ft):	86.0
Antenna Gain (dBi):	16.0
Antenna Size (in.):	72.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	1050.0



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	83.0	84.3	88.3	91.6	95.9	101.4	108.4	117.4	129.2	144.8	166.1	196.5	242.8	320.8	478.2	952.8	1190.5	2379.5	
Distance from Antenna Structure Base in Horizontal plane	0.1	14.7	30.3	38.8	48.0	58.2	69.7	83.1	99.0	118.6	143.8	178.1	228.2	309.9	471.0	949.2	1187.6	2378.0	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.3	0.2	0.2	0.3	0.2	0.1	
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.2	0.4	0.4	0.4	0.3	0.7	0.6	0.2	1.6	1.1	0.8	1.3	1.2	0.3	

Antenna Type DB846F65ZAXY
Max% 1.56%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pc
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

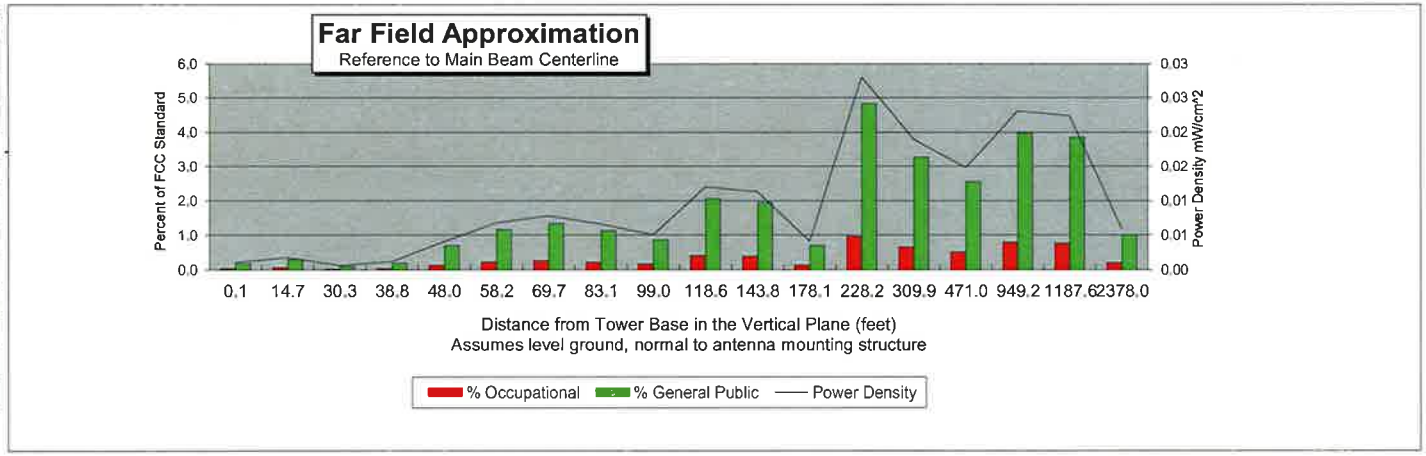
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	East Haven Cosey Beach, CT
Site #:	
Date:	03/12/15
Name:	Mark Brauer
File Name:	East Haven Cosey Beach, CT

Operating Freq. (MHz)	869.0
Antenna Height (ft):	86.0
Antenna Gain (dBi):	16.0
Antenna Size (in.):	72.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	3795.0



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	83.0	84.3	88.3	91.6	95.9	101.4	108.4	117.4	129.2	144.8	166.1	196.5	242.8	320.8	478.2	952.8	1190.5	2379.5	
Distance from Antenna Structure Base in Horizontal plane	0.1	14.7	30.3	38.8	48.0	58.2	69.7	83.1	99.0	118.6	143.8	178.1	228.2	309.9	471.0	949.2	1187.6	2378.0	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.03	0.02	0.01	0.02	0.02	0.01	
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.1	0.2	0.3	0.2	0.2	0.4	0.4	0.1	1.0	0.7	0.5	0.8	0.8	0.2	
Percent of General Population Standard	0.2	0.3	0.1	0.2	0.7	1.2	1.3	1.1	0.9	2.1	1.9	0.7	4.8	3.3	2.5	4.0	3.9	1.0	

Antenna Type DB846F65ZAXY
Max% 4.83%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

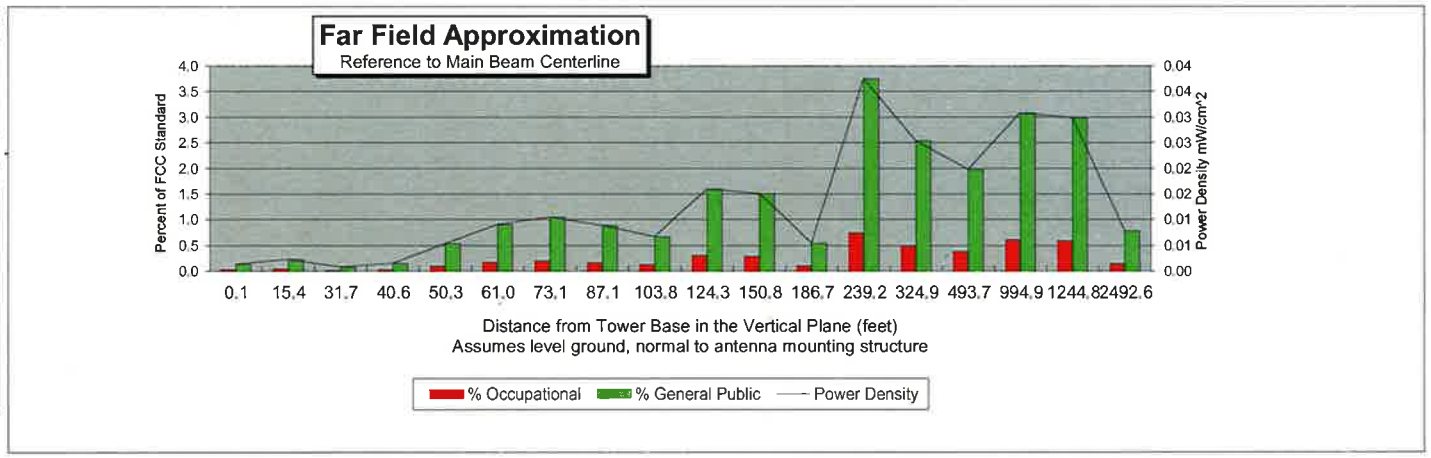
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	East Haven Cosey Beach, CT
Site #:	
Date:	03/12/15
Name:	Mark Brauer
File Name:	East Haven Cosey Beach, CT

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



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	87.0	88.4	92.6	96.0	100.5	106.2	113.6	123.1	135.4	151.7	174.1	206.0	254.5	336.3	501.3	998.7	1247.8	2494.1	
Distance from Antenna Structure Base in Horizontal plane	0.1	15.4	31.7	40.6	50.3	61.0	73.1	87.1	103.8	124.3	150.8	186.7	239.2	324.9	493.7	994.9	1244.8	2492.6	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.04	0.03	0.02	0.03	0.03	0.01	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.3	0.3	0.1	0.7	0.5	0.4	0.6	0.6	0.2	
Percent of General Population Standard	0.1	0.2	0.1	0.2	0.5	0.9	1.0	0.9	0.7	1.6	1.5	0.5	3.7	2.5	2.0	3.1	3.0	0.8	

Antenna Type DB846F65ZAXY
Max% 3.75%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

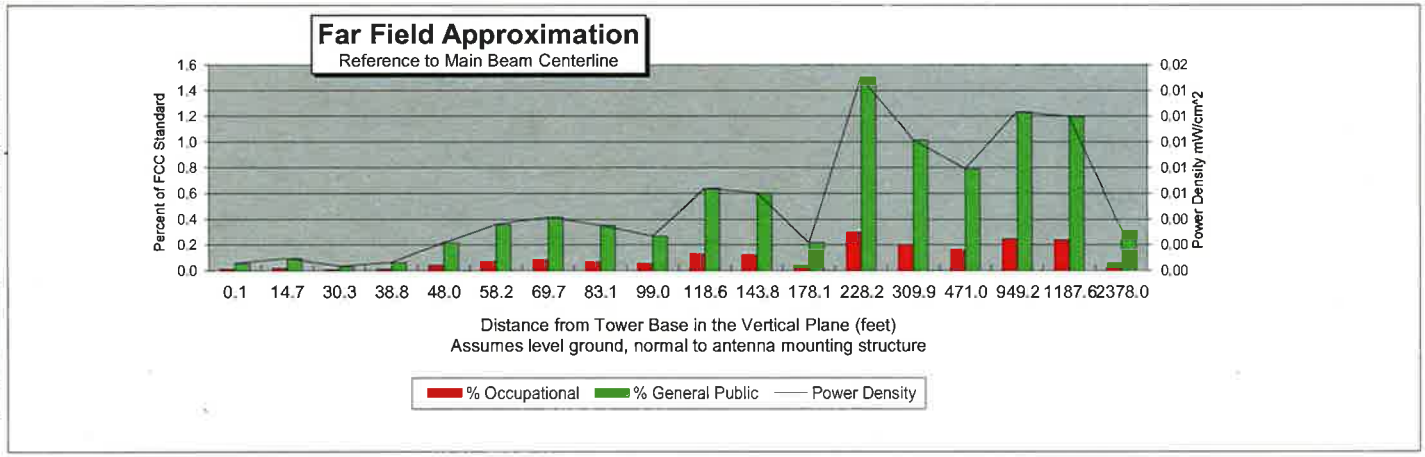
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	East Haven Cosey Beach, CT
Site #:	
Date:	03/12/15
Name:	Mark Brauer
File Name:	East Haven Cosey Beach, CT

Operating Freq. (MHz)	**2110.0**
Antenna Height (ft):	**86.0**
Antenna Gain (dBi):	**16.7**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**1750.0**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	83.0	84.3	88.3	91.6	95.9	101.4	108.4	117.4	129.2	144.8	166.1	196.5	242.8	320.8	478.2	952.8	1190.5	2379.5	
Distance from Antenna Structure Base in Horizontal plane	0.1	14.7	30.3	38.8	48.0	58.2	69.7	83.1	99.0	118.6	143.8	178.1	228.2	309.9	471.0	949.2	1187.6	2378.0	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.3	0.2	0.2	0.2	0.2	0.1	
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.2	0.4	0.4	0.4	0.3	0.6	0.6	0.2	1.5	1.0	0.8	1.2	1.2	0.3	

Antenna Type DB846F65ZAXY
Max% 1.50%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

ATTACHMENT 3

Date: **September 26, 2014**

David Smith
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Aero Solutions, LLC
5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
720-381-2843

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Name:	New Britain NW CT
Crown Castle Designation:	**Crown Castle BU Number:**	876331
	Crown Castle Site Name:	NEW BRITAIN GRAVEL PIT
	Crown Castle JDE Job Number:	303418
	Crown Castle Work Order Number:	926771
	Crown Castle Application Number:	260703 Rev. 0
Engineering Firm Designation:	**Aero Solutions, LLC Project Number:**	003-14-0953R1
Site Data:	**115 North Mountain Rd, NEW BRITAIN, Hartford County, CT** **Latitude *41° 40' 35.72"*, Longitude *-72° 49' 17.09"*** **118 Foot - Monopole Tower**	

Dear David Smith,

Aero Solutions, LLC 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 703843, in accordance with application 260703, 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:

LC4.7: Modified Structure w/ Existing + Reserved + Proposed **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 80 mph fastest mile.

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 *Aero Solutions, LLC* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Benjamin Ude

Respectfully submitted by:

Shraddha Dharia, P.E.
Structural Engineer
CT PE#: PEN0028187
Expires: 1/31/2015

9.26.2014

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

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

The tower has been modified per reinforcement drawings prepared by PJF, in May of 2008. Reinforcement consists of addition of shaft reinforcement, bridge stiffeners and rock anchors. The tower was later reinforced per reinforcement drawings prepared by PJF, in June of 2012. Reinforcement consists of shaft reinforcement and bridge stiffeners. The tower was later reinforced per reinforcement drawings prepared by PJF, in April of 2014. Reinforcement consists of shaft reinforcement.

This analysis considers the proposed modifications in "Appendix D - Modification Drawings".

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
85.0	86.0	1	antel	BXA-171040/8CF w/ Mount Pipe			
		1	kathrein	800 10735V01 w/ Mount Pipe			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
116.0	116.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER			1
		1	tower mounts	Pipe Mount [PM 601-3]			
	113.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
114.0	116.0	3	alcatel lucent	TD-RRH8x20-25	1	1-1/4"	2
		1	rfs celwave	APXV9ERR18-C-A20 w/ Mount Pipe	3	1-1/4"	1
		2	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			2
	114.0	1	tower mounts	Platform Mount [LP 502-1]			1
108.0	108.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1	1-5/8"	2
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		1	tower mounts	Sector Mount [SM 802-3]	12	7/8"	1
98.0	100.0	2	andrew	SBNH-1D6565C w/ Mount Pipe	12 1 2	1-1/4" 3/8" 3/4"	1
		3	communication components inc.	DTMABP7819VG12A			
		3	ericsson	RRUS-11			
		4	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP13519			
		1	raycap	DC6-48-60-18-8F			
	98.0	1	tower mounts	Platform Mount [LP 712-1]			
85.0	90.0	6	andrew	CBC721-DF	12	1-5/8"	1
	86.0	1	antel	BXA-171040/8CF w/ Mount Pipe			3
		2	antel	BXA-171063/8CFx2 w/ Mount Pipe			1
		2	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		1	antel	BXA-70063-6CF-2 w/ Mount Pipe			3
		2	antel	LPA-4016 w/ Mount Pipe			1
		4	antel	LPA-80063/4CF w/ Mount Pipe			
	85.0	1	tower mounts	Platform Mount [LP 303-1]			
80.0	81.0	1	lucent	KS24019-L112A	1	1/2"	1
	80.0	1	tower mounts	Side Arm Mount [SO 701-1]			
72.0	74.0	2	argus technologies	LLPX310R w/ Mount Pipe	3 3 2	5/8" 1/4" 1/2"	1
		2	dragonwave	HORIZON COMPACT			
		3	samsung telecommunications	WIMAX DAP HEAD			
	73.0	1	andrew	VHLP1-23			
	72.0	1	argus technologies	LLPX310R w/ Mount Pipe			
		1	dragonwave	A-ANT-18G-2-C			
		1	tower mounts	Side Arm Mount [SO 101-3]			

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

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
118	118	12		ALP9212	12	1-5/8"
98	98	12		ALP9212	12	1-5/8"

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH	2192549	CCISITES
4-POST-MODIFICATION INSPECTION	TEP	4608281	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Rohn	1947809	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Rohn	1947800	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF	2268906	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) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Monopole was reinforced in conformance with the referenced modification drawings.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	118 - 90	Pole	P24x1/4	1	-7.59	589.19	80.5	Pass
L2	90 - 81	Pole	P24x3/8	2	-10.66	934.94	75.6	Pass
L3	81 - 74	Pole	P24x3/8 [0.518362]	3	-11.91	1263.96	75.5	Pass
L4	74 - 68.75	Pole	P24x3/8 [0.671793]	4	-13.56	1417.13	82.1	Pass
L5	68.75 - 64.5	Pole	P24x3/8 [0.913699]	5	-14.67	1896.79	71.3	Pass
L6	64.5 - 60	Pole	P24x3/8 [0.878957]	6	-15.86	2110.50	72.4	Pass
L7	60 - 42	Pole	P30x3/8 [0.681709]	7	-21.20	1885.99	94.7	Pass
L8	42 - 34.5	Pole	P30x3/8 [0.799317]	8	-23.51	2197.10	93.7	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L9	34.5 - 31	Pole	P30x3/8 [0.799319]	9	-24.59	2197.29	99.3	Pass
L10	31 - 30	Pole	P30x3/8 [0.869719]	10	-24.90	2377.51	93.7	Pass
L11	30 - 25.5	Pole	P36x3/8 [0.61883]	11	-26.67	1956.59	99.7	Pass
L12	25.5 - 23	Pole	P36x3/8 [0.674813]	12	-27.47	2115.23	96.1	Pass
L13	23 - 19	Pole	P36x3/8 [0.72742]	13	-28.84	2285.08	94.5	Pass
L14	19 - 1	Pole	P36x3/8 [0.882626]	14	-35.47	2736.34	99.9	Pass
L15	1 - 0	Pole	P36x3/8 [0.920946]	15	-35.80	2849.43	97.5	Pass
							Summary	
						Pole (L14)	99.9	Pass
						Rating =	99.9	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC4.7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	85.3	Pass
1	Base Plate	0	55.2	Pass
1	Base Foundation Soil Interaction	0	91.3	Pass
1	Flange Connection	90	32.8	Pass
1	Flange Connection	60	66.4	Pass
1	Flange Connection	30	91.4	Pass

Structure Rating (max from all components) =	99.9%

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

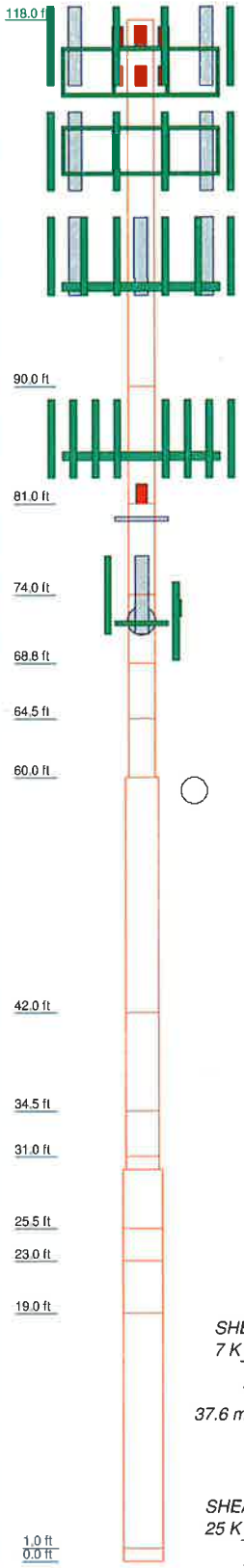
4.1) Recommendations

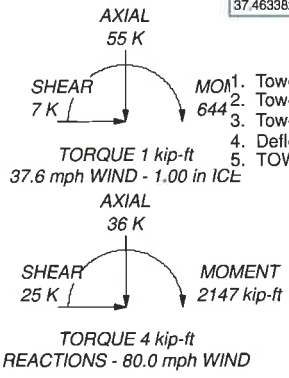
The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads once the proposed modifications are installed.

APPENDIX A

TNXTOWER OUTPUT

Section	Size	Length (ft)	Grade	Weight (K)
1	P24x1/4	28.00	A572-42	1.8
2	P24x3/8	9.00		0.9
3	P24x3/8 [0.518382]	7.00	41.327673ksi	0.9
4	P24x3/8 [0.518382]	5.25	35.988237ksi	0.9
5	P24x3/8 [0.518382]	4.25	35.787364ksi	0.9
6	P24x3/8 [0.518382]	4.50	41.331295ksi	0.9
7	P30x3/8 [0.681709]	18.00	37.555317ksi	4.0
8	P30x1/2 [0.799317]	7.50	37.463382ksi	1.9
9	P30x1/2 [0.799317]	3.50	37ksi	0.9
10	P30x1/2 [0.799317]	1.00	37ksi	0.2
11	P30x1/2 [0.799317]	4.50	37ksi	1.1
12	P30x1/2 [0.799317]	2.50	37ksi	0.7
13	P36x1/2 [0.799317]	4.00	35.466537ksi	1.1
14	P36x3/8 [0.882626]	18.00	35.135036ksi	6.0
15	P36x3/8 [0.920946]	1.00	35.103025ksi	0.3
				22.4





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
PCS 1900MHz 4x45W-65MHz	116	7770.00 w/ Mount Pipe	98
PCS 1900MHz 4x45W-65MHz	116	7770.00 w/ Mount Pipe	98
PCS 1900MHz 4x45W-65MHz	116	SBNH-1D6565C w/ Mount Pipe	98
800MHz 2X50W RRH W/FILTER	116	SBNH-1D6565C w/ Mount Pipe	98
800MHz 2X50W RRH W/FILTER	116	RRUS-11	98
800MHz 2X50W RRH W/FILTER	116	RRUS-11	98
Pipe Mount [PM 601-3]	116	RRUS-11	98
APXVSPP18-C-A20 w/ Mount Pipe	114	(2) LGP13519	98
APXVSPP18-C-A20 w/ Mount Pipe	114	(2) LGP13519	98
APXV9ERR18-C-A20 w/ Mount Pipe	114	(2) LGP13519	98
APXVTM14-C-120 w/ Mount Pipe	114	DTMABP7819VG12A	98
APXVTM14-C-120 w/ Mount Pipe	114	DTMABP7819VG12A	98
APXVTM14-C-120 w/ Mount Pipe	114	DTMABP7819VG12A	98
TD-RRH8x20-25	114	DC6-48-60-18-8F	98
TD-RRH8x20-25	114	Platform Mount [LP 712-1]	98
TD-RRH8x20-25	114	Bridge Stiffener (84" x 14.5" x 1.25")	90
(2) 5' x 2" Pipe Mount	114	(2) LPA-4016 w/ Mount Pipe	85
(2) 5' x 2" Pipe Mount	114	(2) LPA-80063/4CF w/ Mount Pipe	85
(2) 5' x 2" Pipe Mount	114	(2) LPA-80063/4CF w/ Mount Pipe	85
Platform Mount [LP 502-1]	114	BXA-171063/8CFx2 w/ Mount Pipe	85
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	108	BXA-171063/8CFx2 w/ Mount Pipe	85
		BXA-70063-6CF-2 w/ Mount Pipe	85
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108	(2) CBC721-DF	85
		(2) CBC721-DF	85
KRY 112 144/1	108	(2) CBC721-DF	85
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	108	800 10735V01 w/ Mount Pipe	85
		BXA-171040/8CF w/ Mount Pipe	85
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108	Platform Mount [LP 303-1]	85
KRY 112 144/1	108	BXA-70063-6CF-2 w/ Mount Pipe	85
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	108	Side Arm Mount [SO 701-1]	80
		KS24019-L112A	80
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108	LLPX310R w/ Mount Pipe	72
		LLPX310R w/ Mount Pipe	72
KRY 112 144/1	108	WIMAX DAP HEAD	72
5' x 2" Pipe Mount	108	WIMAX DAP HEAD	72
5' x 2" Pipe Mount	108	WIMAX DAP HEAD	72
5' x 2" Pipe Mount	108	HORIZON COMPACT	72
Sector Mount [SM 802-3]	108	HORIZON COMPACT	72
AM-X-CD-16-65-00T-RET w/ Mount Pipe	98	P3x5'	72
		P3x5'	72
AM-X-CD-16-65-00T-RET w/ Mount Pipe	98	Side Arm Mount [SO 101-3]	72
		LLPX310R w/ Mount Pipe	72
(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	98	A-ANT-18G-2-C	72
		VHLP1-23	72
7770.00 w/ Mount Pipe	98	Bridge Stiffener (84" x 14.5" x 1.25")	60
		Bridge Stiffener (84" x 14.5" x 1.25")	30

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-42	42 ksi	60 ksi	37.466537ksi	37 ksi	52 ksi
41.327673ksi	41 ksi	56 ksi	37.348101ksi	37 ksi	52 ksi
35.988237ksi	36 ksi	51 ksi	35.565264ksi	36 ksi	51 ksi
35.787364ksi	36 ksi	51 ksi	35.314844ksi	35 ksi	50 ksi
41.331295ksi	41 ksi	56 ksi	35.4444ksi	35 ksi	50 ksi
37.555317ksi	38 ksi	53 ksi	35.135036ksi	35 ksi	50 ksi
37.463382ksi	37 ksi	52 ksi	35.103025ksi	35 ksi	50 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80.0 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.6 mph basic wind with 1.00 in ice.
4. Deflections are based upon a 50.0 mph wind.
5. TOWER RATING: 100.1%

Aero Solutions, LLC
5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
Phone: 720-381-2843
FAX: 720-304-6883

Job: **BU#876331 NEW BRITAIN GRAVEL PIT**		
Project: ***Existing 118 ft. Monopole***		
Client: CCI	Drawn by: Benjamin Ude	App'd:
Code: TIA/EIA-222-F	Date: 09/15/14	Scale: NTS
Path:		Dwg No. E-1

Tower Input Data

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

4) Tower is located in Hartford County, Connecticut.
5) Basic wind speed of 80.0 mph.
6) Nominal ice thickness of 1.00 in.
7) Ice density of 56 pcf.
8) A wind speed of 37.6 mph is used in combination with ice.
9) Temperature drop of 50 °F.
10) Deflections calculated using a wind speed of 50.0 mph.
11) A non-linear (P-delta) analysis was used.
12) Pressures are calculated at each section.
13) Stress ratio used in pole design is 1.333.
14) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	118.00-90.00	28.00	P24x1/4	A572-42 (42 ksi)	
L2	90.00-81.00	9.00	P24x3/8	A572-42 (42 ksi)	
L3	81.00-74.00	7.00	P24x3/8 [0.518362]	41.327673ksi (41 ksi)	
L4	74.00-68.75	5.25	P24x3/8 [0.671793]	35.988237ksi (36 ksi)	
L5	68.75-64.50	4.25	P24x3/8 [0.913699]	35.787364ksi (36 ksi)	
L6	64.50-60.00	4.50	P24x3/8 [0.878957]	41.331295ksi (41 ksi)	
L7	60.00-42.00	18.00	P30x3/8 [0.681709]	37.555317ksi (38 ksi)	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L8	42.00-34.50	7.50	P30x3/8 [0.799317]	37.463382ksi (37 ksi)	
L9	34.50-31.00	3.50	P30x3/8 [0.799319]	37.466537ksi (37 ksi)	
L10	31.00-30.00	1.00	P30x3/8 [0.869719]	37.348101ksi (37 ksi)	
L11	30.00-25.50	4.50	P36x3/8 [0.61883]	35.565264ksi (36 ksi)	
L12	25.50-23.00	2.50	P36x3/8 [0.674813]	35.314844ksi (35 ksi)	
L13	23.00-19.00	4.00	P36x3/8 [0.72742]	35.4444ksi (35 ksi)	
L14	19.00-1.00	18.00	P36x3/8 [0.882626]	35.135036ksi (35 ksi)	
L15	1.00-0.00	1.00	P36x3/8 [0.920946]	35.103025ksi (35 ksi)	

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 118.00-90.00				1	1	1		
L2 90.00-81.00				1	1	1		
L3 81.00-74.00				1	1	0.963696		
L4 74.00-68.75				1	1	0.977105		
L5 68.75-64.50				1	1	0.929759		
L6 64.50-60.00				1	1	0.965057		
L7 60.00-42.00				1	1	1.03415		
L8 42.00-34.50				1	1	1.00835		
L9 34.50-31.00				1	1	1.00834		
L10 31.00-30.00				1	1	0.910106		
L11 30.00-25.50				1	1	1.04683		
L12 25.50-23.00				1	1	1.04167		
L13 23.00-19.00				1	1	1.04225		
L14 19.00-1.00				1	1	1.00148		
L15 1.00-0.00				1	1	0.906636		

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
***								
HB114-1-08U4-M5J(1 1/4")	B	No	CaAa (Out Of Face)	72.00 - 10.00	3	No Ice	0.00	1.08
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.18
HB114-1-08U4-M5J(1 1/4")	B	No	CaAa (Out Of Face)	116.00 - 72.00	1	No Ice	0.15	1.08
						1/2" Ice	0.25	2.33
						1" Ice	0.35	4.18
HB114-1-08U4-M5J(1 1/4")	B	No	CaAa (Out Of Face)	116.00 - 72.00	2	No Ice	0.00	1.08
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.18
HB114-21U3M12-XXXF(1-1/4")	B	No	CaAa (Out Of Face)	116.00 - 10.00	1	No Ice	0.00	1.22
						1/2" Ice	0.00	2.47
						1" Ice	0.00	4.32
***								
AL5-50(7/8)	B	No	Inside Pole	108.00 - 3.00	12	No Ice	0.00	0.26
						1/2" Ice	0.00	0.26
						1" Ice	0.00	0.26
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	B	No	Inside Pole	108.00 - 3.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	1.07
						1" Ice	0.00	1.07
***								
LDF6-50A(1-1/4")	C	No	Inside Pole	98.00 - 10.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
FB-L98B-002-75000(3/8")	C	No	Inside Pole	98.00 - 10.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	98.00 - 10.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
2" Conduit	C	No	Inside Pole	98.00 - 10.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	2.80
						1" Ice	0.00	2.80
***								
LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	85.00 - 10.00	2	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	85.00 - 10.00	10	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
**								
LDF4-50A(1/2")	B	No	CaAa (Out Of Face)	80.00 - 10.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.84
						1" Ice	0.00	2.14
1" Conduit	B	No	CaAa (Out Of Face)	80.00 - 10.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	4.33
						1" Ice	0.00	6.47
***								
FSJ1-50A(1/4")	B	No	CaAa (Out Of Face)	72.00 - 10.00	3	No Ice	0.00	0.04
						1/2" Ice	0.00	0.53
						1" Ice	0.00	1.62
FSJ4P-50B-1(1/2")	B	No	CaAa (Out Of Face)	72.00 - 10.00	2	No Ice	0.00	0.14
						1/2" Ice	0.00	0.77
						1" Ice	0.00	2.01
HJ4.5-50(5/8")	B	No	CaAa (Out Of Face)	72.00 - 10.00	3	No Ice	0.00	0.40
						1/2" Ice	0.00	1.24
						1" Ice	0.00	2.69
2" Conduit	B	No	CaAa (Out Of	72.00 - 10.00	2	No Ice	0.20	2.80

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
			Face)			1/2" Ice	0.30	4.33
						1" Ice	0.40	6.47
***								
1" BP	C	No	CaAa (Out Of Face)	26.00 - 0.00	1	No Ice	0.17	0.00
						1/2" Ice	0.17	0.00
						1" Ice	0.17	0.00
1" BP	C	No	CaAa (Out Of Face)	56.00 - 34.00	1	No Ice	0.17	0.00
						1/2" Ice	0.17	0.00
						1" Ice	0.17	0.00
0.75" BP	C	No	CaAa (Out Of Face)	75.50 - 64.00	1	No Ice	0.13	0.00
						1/2" Ice	0.13	0.00
						1" Ice	0.13	0.00
***								
1" PL	A	No	CaAa (Out Of Face)	25.50 - 0.00	1	No Ice	0.17	0.00
						1/2" Ice	0.17	0.00
						1" Ice	0.17	0.00
0.75" PL	A	No	CaAa (Out Of Face)	43.00 - 34.00	1	No Ice	0.13	0.00
						1/2" Ice	0.13	0.00
						1" Ice	0.13	0.00
***								
1"PL	A	No	CaAa (Out Of Face)	70.25 - 60.00	1	No Ice	0.13	0.00
						1/2" Ice	0.13	0.00
						1" Ice	0.13	0.00
**								
0.75 PL	A	No	CaAa (Out Of Face)	26.50 - 25.50	1	No Ice	0.13	0.00
						1/2" Ice	0.13	0.00
						1" Ice	0.13	0.00
0.75 PL	A	No	CaAa (Out Of Face)	82.00 - 70.25	1	No Ice	0.13	0.00
						1/2" Ice	0.13	0.00
						1" Ice	0.13	0.00
**								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	118.00-90.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	4.004	0.19
		C	0.000	0.000	0.000	0.000	0.10
L2	90.00-81.00	A	0.000	0.000	0.000	1.709	0.04
		B	0.000	0.000	0.000	1.386	0.08
		C	0.000	0.000	0.000	0.000	0.11
L3	81.00-74.00	A	0.000	0.000	0.000	3.647	0.07
		B	0.000	0.000	0.000	1.078	0.08
		C	0.000	0.000	0.000	0.188	0.08
L4	74.00-68.75	A	0.000	0.000	0.000	2.740	0.05
		B	0.000	0.000	0.000	1.608	0.08
		C	0.000	0.000	0.000	0.656	0.06
L5	68.75-64.50	A	0.000	0.000	0.000	2.227	0.04
		B	0.000	0.000	0.000	1.700	0.08
		C	0.000	0.000	0.000	0.531	0.05
L6	64.50-60.00	A	0.000	0.000	0.000	2.358	0.04
		B	0.000	0.000	0.000	1.800	0.08
		C	0.000	0.000	0.000	0.063	0.05
L7	60.00-42.00	A	0.000	0.000	0.000	7.253	0.18
		B	0.000	0.000	0.000	7.200	0.34
		C	0.000	0.000	0.000	2.324	0.22
L8	42.00-34.50	A	0.000	0.000	0.000	3.908	0.07
		B	0.000	0.000	0.000	3.000	0.14
		C	0.000	0.000	0.000	1.245	0.09
L9	34.50-31.00	A	0.000	0.000	0.000	1.449	0.03
		B	0.000	0.000	0.000	1.400	0.07
		C	0.000	0.000	0.000	0.083	0.04
L10	31.00-30.00	A	0.000	0.000	0.000	0.396	0.01
		B	0.000	0.000	0.000	0.400	0.02

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
		C	0.000	0.000	0.000	0.000	0.01
L11	30.00-25.50	A	0.000	0.000	0.000	1.907	0.04
		B	0.000	0.000	0.000	1.800	0.08
		C	0.000	0.000	0.000	0.083	0.05
L12	25.50-23.00	A	0.000	0.000	0.000	1.405	0.02
		B	0.000	0.000	0.000	1.000	0.05
		C	0.000	0.000	0.000	0.415	0.03
L13	23.00-19.00	A	0.000	0.000	0.000	2.248	0.04
		B	0.000	0.000	0.000	1.600	0.08
		C	0.000	0.000	0.000	0.664	0.05
L14	19.00-1.00	A	0.000	0.000	0.000	6.552	0.09
		B	0.000	0.000	0.000	3.600	0.20
		C	0.000	0.000	0.000	2.988	0.11
L15	1.00-0.00	A	0.000	0.000	0.000	0.166	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.166	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	118.00-90.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	9.204	0.51
		C		0.000	0.000	0.000	0.000	0.10
L2	90.00-81.00	A	1.000	0.000	0.000	0.000	3.309	0.21
		B		0.000	0.000	0.000	3.186	0.19
		C		0.000	0.000	0.000	0.000	0.11
L3	81.00-74.00	A	1.000	0.000	0.000	0.000	6.447	0.37
		B		0.000	0.000	0.000	2.478	0.20
		C		0.000	0.000	0.000	0.188	0.08
L4	74.00-68.75	A	1.000	0.000	0.000	0.000	4.840	0.28
		B		0.000	0.000	0.000	3.308	0.25
		C		0.000	0.000	0.000	0.656	0.06
L5	68.75-64.50	A	1.000	0.000	0.000	0.000	3.927	0.23
		B		0.000	0.000	0.000	3.400	0.25
		C		0.000	0.000	0.000	0.531	0.05
L6	64.50-60.00	A	1.000	0.000	0.000	0.000	4.158	0.24
		B		0.000	0.000	0.000	3.600	0.27
		C		0.000	0.000	0.000	0.063	0.05
L7	60.00-42.00	A	1.000	0.000	0.000	0.000	14.453	0.96
		B		0.000	0.000	0.000	14.400	1.07
		C		0.000	0.000	0.000	2.324	0.22
L8	42.00-34.50	A	1.000	0.000	0.000	0.000	6.908	0.40
		B		0.000	0.000	0.000	6.000	0.45
		C		0.000	0.000	0.000	1.245	0.09
L9	34.50-31.00	A	1.000	0.000	0.000	0.000	2.849	0.19
		B		0.000	0.000	0.000	2.800	0.21
		C		0.000	0.000	0.000	0.083	0.04
L10	31.00-30.00	A	1.000	0.000	0.000	0.000	0.796	0.05
		B		0.000	0.000	0.000	0.800	0.06
		C		0.000	0.000	0.000	0.000	0.01
L11	30.00-25.50	A	1.000	0.000	0.000	0.000	3.707	0.24
		B		0.000	0.000	0.000	3.600	0.27
		C		0.000	0.000	0.000	0.083	0.05
L12	25.50-23.00	A	1.000	0.000	0.000	0.000	2.405	0.13
		B		0.000	0.000	0.000	2.000	0.15
		C		0.000	0.000	0.000	0.415	0.03
L13	23.00-19.00	A	1.000	0.000	0.000	0.000	3.848	0.21
		B		0.000	0.000	0.000	3.200	0.24
		C		0.000	0.000	0.000	0.664	0.05
L14	19.00-1.00	A	1.000	0.000	0.000	0.000	10.152	0.48
		B		0.000	0.000	0.000	7.200	0.57
		C		0.000	0.000	0.000	2.988	0.11
L15	1.00-0.00	A	1.000	0.000	0.000	0.000	0.166	0.00
		B		0.000	0.000	0.000	0.000	0.00

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
		C		0.000	0.000	0.000	0.166	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	118.00-90.00	0.17	0.10	0.34	0.20
L2	90.00-81.00	0.17	-0.14	0.32	-0.20
L3	81.00-74.00	0.12	-0.48	0.25	-0.63
L4	74.00-68.75	0.16	-0.31	0.34	-0.42
L5	68.75-64.50	0.23	-0.26	0.44	-0.34
L6	64.50-60.00	0.34	-0.32	0.52	-0.40
L7	60.00-42.00	0.26	-0.15	0.50	-0.29
L8	42.00-34.50	0.21	-0.25	0.45	-0.36
L9	34.50-31.00	0.37	-0.23	0.59	-0.35
L10	31.00-30.00	0.39	-0.22	0.61	-0.35
L11	30.00-25.50	0.39	-0.25	0.63	-0.39
L12	25.50-23.00	0.22	-0.30	0.48	-0.42
L13	23.00-19.00	0.22	-0.30	0.48	-0.42
L14	19.00-1.00	0.04	-0.22	0.21	-0.29
L15	1.00-0.00	-0.19	-0.11	-0.18	-0.11

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
***								
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00 0.00 -3.00	50.000	116.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00 0.00 -3.00	30.000	116.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00 0.00 -3.00	-10.000	116.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
800MHz 2X50W RRH W/FILTER	A	From Leg	1.00 0.00 0.00	50.000	116.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	B	From Leg	1.00 0.00 0.00	30.000	116.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	1.00 0.00 0.00	-10.000	116.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11
Pipe Mount [PM 601-3]	C	None		0.000	116.00	No Ice 1/2" Ice 1" Ice	4.39 5.48 6.57	4.39 5.48 6.57	0.20 0.24 0.28

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
***									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	30.000	114.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.95 8.13 9.02	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	30.000	114.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.95 8.13 9.02	0.08 0.15 0.23
APXV9ERR18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	-30.000	114.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	7.47 8.66 9.56	0.09 0.16 0.24
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	30.000	114.00	No Ice 1/2" Ice 1" Ice	7.13 7.66 8.18	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	30.000	114.00	No Ice 1/2" Ice 1" Ice	7.13 7.66 8.18	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	-30.000	114.00	No Ice 1/2" Ice 1" Ice	7.13 7.66 8.18	4.96 5.75 6.47	0.08 0.13 0.19
TD-RRH8x20-25	A	From Leg	4.00 0.00 2.00	30.000	114.00	No Ice 1/2" Ice 1" Ice	4.72 5.01 5.32	1.70 1.92 2.15	0.07 0.10 0.13
TD-RRH8x20-25	B	From Leg	4.00 0.00 2.00	30.000	114.00	No Ice 1/2" Ice 1" Ice	4.72 5.01 5.32	1.70 1.92 2.15	0.07 0.10 0.13
TD-RRH8x20-25	C	From Leg	4.00 0.00 2.00	-30.000	114.00	No Ice 1/2" Ice 1" Ice	4.72 5.01 5.32	1.70 1.92 2.15	0.07 0.10 0.13
(2) 5' x 2" Pipe Mount	A	From Leg	4.00 0.00 2.00	30.000	114.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05
(2) 5' x 2" Pipe Mount	B	From Leg	4.00 0.00 2.00	30.000	114.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05
(2) 5' x 2" Pipe Mount	C	From Leg	4.00 0.00 2.00	-30.000	114.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05
Platform Mount [LP 502-1]	C	None		0.000	114.00	No Ice 1/2" Ice 1" Ice	32.35 45.67 58.99	32.35 45.67 58.99	0.93 1.19 1.46
***									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.83 7.35 7.86	5.64 6.48 7.26	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.83 7.35 7.86	5.64 6.48 7.26	0.11 0.17 0.23
KRY 112 144/1	A	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice	0.41 0.50 0.59	0.17 0.24 0.31	0.01 0.01 0.02

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
							1" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00	0.00	0.000	108.00	No Ice	6.83	5.64	0.11
			0.00				1/2" Ice	7.35	6.48	0.17
			0.00				1" Ice	7.86	7.26	0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00	0.00	0.000	108.00	No Ice	6.83	5.64	0.11
			0.00				1/2" Ice	7.35	6.48	0.17
			0.00				1" Ice	7.86	7.26	0.23
KRY 112 144/1	B	From Leg	4.00	0.00	0.000	108.00	No Ice	0.41	0.17	0.01
			0.00				1/2" Ice	0.50	0.24	0.01
			0.00				1" Ice	0.59	0.31	0.02
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00	0.00	0.000	108.00	No Ice	6.83	5.64	0.11
			0.00				1/2" Ice	7.35	6.48	0.17
			0.00				1" Ice	7.86	7.26	0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00	0.00	0.000	108.00	No Ice	6.83	5.64	0.11
			0.00				1/2" Ice	7.35	6.48	0.17
			0.00				1" Ice	7.86	7.26	0.23
KRY 112 144/1	C	From Leg	4.00	0.00	0.000	108.00	No Ice	0.41	0.17	0.01
			0.00				1/2" Ice	0.50	0.24	0.01
			0.00				1" Ice	0.59	0.31	0.02
5' x 2" Pipe Mount	A	From Leg	4.00	0.00	0.000	108.00	No Ice	1.00	1.00	0.03
			0.00				1/2" Ice	1.39	1.39	0.04
			0.00				1" Ice	1.70	1.70	0.05
5' x 2" Pipe Mount	B	From Leg	4.00	0.00	0.000	108.00	No Ice	1.00	1.00	0.03
			0.00				1/2" Ice	1.39	1.39	0.04
			0.00				1" Ice	1.70	1.70	0.05
5' x 2" Pipe Mount	C	From Leg	4.00	0.00	0.000	108.00	No Ice	1.00	1.00	0.03
			0.00				1/2" Ice	1.39	1.39	0.04
			0.00				1" Ice	1.70	1.70	0.05
Sector Mount [SM 802-3]	C	None			0.000	108.00	No Ice	24.41	24.41	0.93
							1/2" Ice	31.39	31.39	1.36
							1" Ice	38.37	38.37	1.79
***										
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.00	10.000	98.00	No Ice	8.50	6.30	0.07
			0.00				1/2" Ice	9.15	7.48	0.14
			2.00				1" Ice	9.77	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.00	0.000	98.00	No Ice	8.50	6.30	0.07
			0.00				1/2" Ice	9.15	7.48	0.14
			2.00				1" Ice	9.77	8.37	0.21
(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.00	0.000	98.00	No Ice	8.50	6.30	0.07
			0.00				1/2" Ice	9.15	7.48	0.14
			2.00				1" Ice	9.77	8.37	0.21
7770.00 w/ Mount Pipe	A	From Leg	4.00	0.00	10.000	98.00	No Ice	6.12	4.25	0.06
			0.00				1/2" Ice	6.63	5.01	0.10
			2.00				1" Ice	7.13	5.71	0.16
7770.00 w/ Mount Pipe	B	From Leg	4.00	0.00	0.000	98.00	No Ice	6.12	4.25	0.06
			0.00				1/2" Ice	6.63	5.01	0.10
			2.00				1" Ice	7.13	5.71	0.16
7770.00 w/ Mount Pipe	C	From Leg	4.00	0.00	0.000	98.00	No Ice	6.12	4.25	0.06
			0.00				1/2" Ice	6.63	5.01	0.10
			2.00				1" Ice	7.13	5.71	0.16

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			
SBNH-1D6565C w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	10.000	98.00	No Ice 1/2" Ice 1" Ice	11.68 12.40 13.14	9.84 11.37 12.91	0.10 0.19 0.29
SBNH-1D6565C w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	11.68 12.40 13.14	9.84 11.37 12.91	0.10 0.19 0.29
RRUS-11	A	From Leg	4.00 0.00 2.00	10.000	98.00	No Ice 1/2" Ice 1" Ice	2.94 3.17 3.41	1.25 1.41 1.59	0.06 0.07 0.10
RRUS-11	B	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	2.94 3.17 3.41	1.25 1.41 1.59	0.06 0.07 0.10
RRUS-11	C	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	2.94 3.17 3.41	1.25 1.41 1.59	0.06 0.07 0.10
(2) LGP13519	A	From Leg	4.00 0.00 2.00	10.000	98.00	No Ice 1/2" Ice 1" Ice	0.34 0.42 0.51	0.21 0.28 0.36	0.01 0.01 0.01
(2) LGP13519	B	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	0.34 0.42 0.51	0.21 0.28 0.36	0.01 0.01 0.01
(2) LGP13519	C	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	0.34 0.42 0.51	0.21 0.28 0.36	0.01 0.01 0.01
DTMABP7819VG12A	A	From Leg	4.00 0.00 2.00	10.000	98.00	No Ice 1/2" Ice 1" Ice	1.14 1.28 1.44	0.39 0.49 0.59	0.02 0.03 0.04
DTMABP7819VG12A	B	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	1.14 1.28 1.44	0.39 0.49 0.59	0.02 0.03 0.04
DTMABP7819VG12A	C	From Leg	4.00 0.00 2.00	0.000	98.00	No Ice 1/2" Ice 1" Ice	1.14 1.28 1.44	0.39 0.49 0.59	0.02 0.03 0.04
DC6-48-60-18-8F	A	From Leg	4.00 0.00 2.00	10.000	98.00	No Ice 1/2" Ice 1" Ice	2.57 2.80 3.04	2.57 2.80 3.04	0.03 0.06 0.08
Platform Mount [LP 712-1]	C	None		0.000	98.00	No Ice 1/2" Ice 1" Ice	24.53 29.94 35.35	24.53 29.94 35.35	1.34 1.65 1.96
***									
BXA-70063-6CF-2 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	7.97 8.61 9.22	5.80 6.95 7.82	0.04 0.10 0.17
(2) LPA-4016 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	10.01 10.52 11.04	7.46 8.15 8.87	0.04 0.12 0.21
(2) LPA-80063/4CF w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	30.000	85.00	No Ice 1/2" Ice	7.25 7.72 8.20	7.26 7.96 8.67	0.04 0.10 0.18

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			
(2) LPA-80063/4CF w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	7.25 7.72 8.20	7.26 7.96 8.67	0.04 0.10 0.18
BXA-171063/8CFx2 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	3.18 3.56 3.96	3.35 3.97 4.60	0.03 0.06 0.10
BXA-171063/8CFx2 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	3.18 3.56 3.96	3.35 3.97 4.60	0.03 0.06 0.10
BXA-70063-6CF-2 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	7.97 8.61 9.22	5.80 6.95 7.82	0.04 0.10 0.17
(2) CBC721-DF	A	From Leg	4.00 0.00 5.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	0.45 0.54 0.64	0.12 0.18 0.26	0.00 0.01 0.01
(2) CBC721-DF	B	From Leg	4.00 0.00 5.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	0.45 0.54 0.64	0.12 0.18 0.26	0.00 0.01 0.01
(2) CBC721-DF	C	From Leg	4.00 0.00 5.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	0.45 0.54 0.64	0.12 0.18 0.26	0.00 0.01 0.01
800 10735V01 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	9.04 9.72 10.37	5.49 6.71 7.69	0.06 0.12 0.19
BXA-171040/8CF w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	30.000	85.00	No Ice 1/2" Ice 1" Ice	5.84 6.30 6.76	3.61 4.24 4.87	0.03 0.07 0.12
Platform Mount [LP 303-1]	C	None		0.000	85.00	No Ice 1/2" Ice 1" Ice	14.66 18.87 23.08	14.66 18.87 23.08	1.25 1.48 1.71
***									
KS24019-L112A	A	From Leg	3.00 0.00 1.00	0.000	80.00	No Ice 1/2" Ice 1" Ice	0.16 0.22 0.30	0.16 0.22 0.30	0.01 0.01 0.01
Side Arm Mount [SO 701-1]	A	From Leg	1.50 0.00 0.00	0.000	80.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
***									
LLPX310R w/ Mount Pipe	A	From Leg	2.00 0.00 2.00	30.000	72.00	No Ice 1/2" Ice 1" Ice	5.07 5.48 5.91	2.98 3.53 4.09	0.05 0.08 0.13
LLPX310R w/ Mount Pipe	B	From Leg	2.00 0.00 0.00	30.000	72.00	No Ice 1/2" Ice 1" Ice	5.07 5.48 5.91	2.98 3.53 4.09	0.05 0.08 0.13
LLPX310R w/ Mount Pipe	C	From Leg	2.00 0.00 2.00	30.000	72.00	No Ice 1/2" Ice 1" Ice	5.07 5.48 5.91	2.98 3.53 4.09	0.05 0.08 0.13
WIMAX DAP HEAD	A	From Leg	2.00 0.00	30.000	72.00	No Ice 1/2"	1.80 1.99	0.78 0.92	0.03 0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.00			Ice 1" Ice	2.18	1.07	0.06
WIMAX DAP HEAD	B	From Leg	2.00 0.00 2.00	30.000	72.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
WIMAX DAP HEAD	B	From Leg	2.00 0.00 2.00	30.000	72.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
HORIZON COMPACT	A	From Leg	2.00 0.00 2.00	30.000	72.00	No Ice 1/2" Ice 1" Ice	0.20 0.27 0.35	0.20 0.27 0.35	0.01 0.01 0.02
HORIZON COMPACT	B	From Leg	2.00 0.00 2.00	30.000	72.00	No Ice 1/2" Ice 1" Ice	0.20 0.27 0.35	0.20 0.27 0.35	0.01 0.01 0.02
P3x5'	A	From Leg	2.00 0.00 0.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	1.50 1.80 2.12	1.50 1.80 2.12	0.02 0.03 0.05
P3x5'	B	From Leg	2.00 0.00 0.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	1.50 1.80 2.12	1.50 1.80 2.12	0.02 0.03 0.05
Side Arm Mount [SO 101-3]	C	None		0.000	72.00	No Ice 1/2" Ice 1" Ice	7.50 8.90 10.30	7.50 8.90 10.30	0.25 0.33 0.41
***									
Bridge Stiffener (84" x 14.5" x 1.25")	C	None		0.000	90.00	No Ice 1/2" Ice 1" Ice	11.84 12.48 13.14	1.46 2.25 3.06	0.43 0.48 0.53
Bridge Stiffener (84" x 14.5" x 1.25")	C	None		0.000	60.00	No Ice 1/2" Ice 1" Ice	11.84 12.48 13.14	1.46 2.25 3.06	0.43 0.48 0.53
Bridge Stiffener (84" x 14.5" x 1.25")	C	None		0.000	30.00	No Ice 1/2" Ice 1" Ice	11.84 12.48 13.14	1.46 2.25 3.06	0.43 0.48 0.53
***									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
**											
A-ANT-18G-2-C	A	Paraboloid w/o Radome	From Leg	2.00 0.00 0.00	30.000		72.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07
VHLP1-23	B	Paraboloid w/o Radome	From Leg	2.00 0.00 1.00	30.000		72.00	1.27	No Ice 1/2" Ice 1" Ice	1.28 1.45 1.62	0.01 0.02 0.03

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft^2	Weight K
**										

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	118 - 90	Pole	Max Tension	27	0.00	0	0
			Max. Compression	14	-15.37	-1	0
			Max. Mx	5	-7.65	-216	4
			Max. My	2	-7.60	-4	226
			Max. Vy	11	-12.56	216	-4
			Max. Vx	2	-12.94	-4	226
			Max. Torque	5			2
L2	90 - 81	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-21.29	-1	1
			Max. Mx	5	-10.74	-353	6
			Max. My	2	-10.67	-6	367

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	11	-17.00	352	-6
			Max. Vx	2	-17.55	-6	367
			Max. Torque	5			3
L3	81 - 74	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-23.15	-1	2
			Max. Mx	5	-11.98	-474	9
			Max. My	2	-11.92	-9	492
			Max. Vy	11	-17.54	473	-8
			Max. Vx	2	-18.05	-9	492
			Max. Torque	5			3
L4	74 - 68.75	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-25.97	-2	2
			Max. Mx	5	-13.63	-571	11
			Max. My	2	-13.57	-10	593
			Max. Vy	11	-19.03	570	-10
			Max. Vx	8	19.63	10	-591
			Max. Torque	11			-4
L5	68.75 - 64.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-27.52	-2	3
			Max. Mx	5	-14.74	-653	12
			Max. My	2	-14.68	-12	677
			Max. Vy	11	-19.36	652	-11
			Max. Vx	8	19.96	11	-675
			Max. Torque	11			-4
L6	64.5 - 60	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-29.16	-2	3
			Max. Mx	5	-15.92	-740	14
			Max. My	2	-15.87	-13	767
			Max. Vy	11	-19.67	740	-13
			Max. Vx	8	20.27	13	-766
			Max. Torque	11			-4
L7	60 - 42	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-36.60	-4	3
			Max. Mx	11	-21.24	1112	-21
			Max. My	2	-21.21	-18	1150
			Max. Vy	11	-21.37	1112	-21
			Max. Vx	8	21.96	20	-1150
			Max. Torque	11			-4
L8	42 - 34.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-39.71	-4	4
			Max. Mx	11	-23.54	1274	-24
			Max. My	2	-23.51	-21	1316
			Max. Vy	11	-21.85	1274	-24
			Max. Vx	8	22.45	23	-1316
			Max. Torque	11			-4
L9	34.5 - 31	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-41.16	-4	4
			Max. Mx	11	-24.62	1351	-25
			Max. My	2	-24.60	-22	1395
			Max. Vy	11	-22.03	1351	-25
			Max. Vx	8	22.62	25	-1395
			Max. Torque	11			-4
L10	31 - 30	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-41.57	-4	4
			Max. Mx	11	-24.93	1373	-26
			Max. My	2	-24.90	-22	1418
			Max. Vy	11	-22.07	1373	-26
			Max. Vx	8	22.67	25	-1418
			Max. Torque	11			-4
L11	30 - 25.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-43.97	-5	4
			Max. Mx	11	-26.70	1474	-28
			Max. My	8	-26.68	27	-1522
			Max. Vy	11	-22.68	1474	-28
			Max. Vx	8	23.27	27	-1522
			Max. Torque	11			-4
L12	25.5 - 23	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-45.06	-5	4
			Max. Mx	11	-27.49	1531	-29

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	8	-27.48	28	-1580
			Max. Vy	11	-22.85	1531	-29
			Max. Vx	8	23.44	28	-1580
			Max. Torque	11			-4
L13	23 - 19	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-46.88	-5	4
			Max. Mx	11	-28.86	1623	-30
			Max. My	8	-28.84	29	-1674
			Max. Vy	11	-23.12	1623	-30
			Max. Vx	8	23.71	29	-1674
			Max. Torque	11			-4
L14	19 - 1	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-54.83	-6	4
			Max. Mx	11	-35.47	2047	-38
			Max. My	8	-35.47	36	-2109
			Max. Vy	11	-24.05	2047	-38
			Max. Vx	8	24.63	36	-2109
			Max. Torque	11			-4
L15	1 - 0	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-55.18	-6	4
			Max. Mx	11	-35.80	2072	-38
			Max. My	8	-35.80	37	-2134
			Max. Vy	11	-24.09	2072	-38
			Max. Vx	8	24.67	37	-2134
			Max. Torque	11			-4

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	55.18	0.00	-0.00
	Max. H_x	11	35.81	24.07	-0.41
	Max. H_z	2	35.81	-0.27	24.61
	Max. M_x	2	2133	-0.27	24.61
	Max. M_z	5	2070	-24.00	0.31
	Max. Torsion	5	4	-24.00	0.31
	Min. Vert	2	35.81	-0.27	24.61
	Min. H_x	5	35.81	-24.00	0.31
	Min. H_z	8	35.81	0.40	-24.65
	Min. M_x	8	-2134	0.40	-24.65
	Min. M_z	11	-2072	24.07	-0.41
	Min. Torsion	11	-4	24.07	-0.41

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	35.81	0.00	-0.00	-1	-2	0
Dead+Wind 0 deg - No Ice	35.81	0.27	-24.61	-2133	-30	0
Dead+Wind 30 deg - No Ice	35.81	12.25	-21.51	-1866	-1061	-2
Dead+Wind 60 deg - No Ice	35.81	20.95	-12.55	-1093	-1809	-3
Dead+Wind 90 deg - No Ice	35.81	24.00	-0.31	-33	-2070	-4
Dead+Wind 120 deg - No Ice	35.81	20.62	12.01	1035	-1775	-3
Dead+Wind 150 deg - No Ice	35.81	11.63	21.26	1837	-1001	-1
Dead+Wind 180 deg - No Ice	35.81	-0.40	24.65	2134	37	0
Dead+Wind 210 deg - No Ice	35.81	-12.31	21.52	1865	1063	2
Dead+Wind 240 deg - No Ice	35.81	-20.95	12.66	1099	1806	3
Dead+Wind 270 deg - No Ice	35.81	-24.07	0.41	38	2072	4
Dead+Wind 300 deg - No Ice	35.81	-20.62	-12.05	-1040	1772	3

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+Wind 330 deg - No Ice	35.81	-11.75	-21.16	-1832	1006	2
Dead+Ice+Temp	55.18	-0.00	0.00	-4	-6	0
Dead+Wind 0 deg+Ice+Temp	55.18	0.05	-7.12	-639	-12	0
Dead+Wind 30 deg+Ice+Temp	55.18	3.55	-6.20	-558	-322	0
Dead+Wind 60 deg+Ice+Temp	55.18	6.10	-3.60	-327	-548	-1
Dead+Wind 90 deg+Ice+Temp	55.18	7.00	-0.06	-11	-628	-1
Dead+Wind 120 deg+Ice+Temp	55.18	6.03	3.49	306	-541	-1
Dead+Wind 150 deg+Ice+Temp	55.18	3.42	6.16	543	-310	-1
Dead+Wind 180 deg+Ice+Temp	55.18	-0.09	7.12	630	2	0
Dead+Wind 210 deg+Ice+Temp	55.18	-3.57	6.20	549	312	0
Dead+Wind 240 deg+Ice+Temp	55.18	-6.10	3.63	320	537	1
Dead+Wind 270 deg+Ice+Temp	55.18	-7.02	0.09	4	618	1
Dead+Wind 300 deg+Ice+Temp	55.18	-6.03	-3.51	-316	530	1
Dead+Wind 330 deg+Ice+Temp	55.18	-3.45	-6.13	-551	300	1
Dead+Wind 0 deg - Service	35.81	0.10	-9.61	-834	-13	0
Dead+Wind 30 deg - Service	35.81	4.78	-8.40	-730	-416	-1
Dead+Wind 60 deg - Service	35.81	8.18	-4.90	-428	-708	-1
Dead+Wind 90 deg - Service	35.81	9.38	-0.12	-13	-810	-1
Dead+Wind 120 deg - Service	35.81	8.05	4.69	404	-695	-1
Dead+Wind 150 deg - Service	35.81	4.54	8.30	717	-392	-1
Dead+Wind 180 deg - Service	35.81	-0.16	9.63	834	13	0
Dead+Wind 210 deg - Service	35.81	-4.81	8.41	728	415	1
Dead+Wind 240 deg - Service	35.81	-8.18	4.95	429	705	1
Dead+Wind 270 deg - Service	35.81	-9.40	0.16	14	809	1
Dead+Wind 300 deg - Service	35.81	-8.05	-4.71	-407	692	1
Dead+Wind 330 deg - Service	35.81	-4.59	-8.27	-716	392	1

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-35.81	0.00	-0.00	35.81	0.00	0.000%
2	0.27	-35.81	-24.62	-0.27	35.81	24.61	0.003%
3	12.25	-35.81	-21.51	-12.25	35.81	21.51	0.000%
4	20.95	-35.81	-12.55	-20.95	35.81	12.55	0.000%
5	24.00	-35.81	-0.31	-24.00	35.81	0.31	0.001%
6	20.62	-35.81	12.01	-20.62	35.81	-12.01	0.000%
7	11.63	-35.81	21.26	-11.63	35.81	-21.26	0.000%
8	-0.40	-35.81	24.66	0.40	35.81	-24.65	0.003%
9	-12.31	-35.81	21.52	12.31	35.81	-21.52	0.000%
10	-20.95	-35.81	12.66	20.95	35.81	-12.66	0.000%
11	-24.08	-35.81	0.41	24.07	35.81	-0.41	0.001%
12	-20.62	-35.81	-12.05	20.62	35.81	12.05	0.000%
13	-11.75	-35.81	-21.16	11.75	35.81	21.16	0.000%
14	0.00	-55.18	0.00	0.00	55.18	-0.00	0.003%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
15	0.05	-55.18	-7.12	-0.05	55.18	7.12	0.000%
16	3.55	-55.18	-6.20	-3.55	55.18	6.20	0.000%
17	6.10	-55.18	-3.60	-6.10	55.18	3.60	0.000%
18	7.00	-55.18	-0.06	-7.00	55.18	0.06	0.000%
19	6.03	-55.18	3.49	-6.03	55.18	-3.49	0.000%
20	3.42	-55.18	6.16	-3.42	55.18	-6.16	0.000%
21	-0.09	-55.18	7.12	0.09	55.18	-7.12	0.000%
22	-3.57	-55.18	6.20	3.57	55.18	-6.20	0.000%
23	-6.10	-55.18	3.63	6.10	55.18	-3.63	0.000%
24	-7.02	-55.18	0.09	7.02	55.18	-0.09	0.000%
25	-6.03	-55.18	-3.51	6.03	55.18	3.51	0.000%
26	-3.45	-55.18	-6.13	3.45	55.18	6.13	0.000%
27	0.10	-35.81	-9.62	-0.10	35.81	9.61	0.004%
28	4.78	-35.81	-8.40	-4.78	35.81	8.40	0.001%
29	8.18	-35.81	-4.90	-8.18	35.81	4.90	0.000%
30	9.38	-35.81	-0.12	-9.38	35.81	0.12	0.001%
31	8.05	-35.81	4.69	-8.05	35.81	-4.69	0.001%
32	4.54	-35.81	8.31	-4.54	35.81	-8.30	0.001%
33	-0.16	-35.81	9.63	0.16	35.81	-9.63	0.004%
34	-4.81	-35.81	8.41	4.81	35.81	-8.41	0.001%
35	-8.18	-35.81	4.95	8.18	35.81	-4.95	0.001%
36	-9.40	-35.81	0.16	9.40	35.81	-0.16	0.001%
37	-8.05	-35.81	-4.71	8.05	35.81	4.71	0.001%
38	-4.59	-35.81	-8.27	4.59	35.81	8.27	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	13	0.00000001	0.00006075
3	Yes	16	0.00000001	0.00007676
4	Yes	16	0.00000001	0.00008844
5	Yes	14	0.00000001	0.00014456
6	Yes	16	0.00000001	0.00006775
7	Yes	16	0.00000001	0.00007717
8	Yes	13	0.00000001	0.00012164
9	Yes	16	0.00000001	0.00008660
10	Yes	16	0.00000001	0.00007454
11	Yes	14	0.00000001	0.00010316
12	Yes	16	0.00000001	0.00008081
13	Yes	16	0.00000001	0.00007052
14	Yes	7	0.00000001	0.00001566
15	Yes	14	0.00000001	0.00013179
16	Yes	15	0.00000001	0.00006114
17	Yes	15	0.00000001	0.00006157
18	Yes	14	0.00000001	0.00013039
19	Yes	14	0.00000001	0.00014734
20	Yes	15	0.00000001	0.00005897
21	Yes	14	0.00000001	0.00012928
22	Yes	15	0.00000001	0.00005952
23	Yes	14	0.00000001	0.00014892
24	Yes	14	0.00000001	0.00012773
25	Yes	14	0.00000001	0.00014977
26	Yes	14	0.00000001	0.00014853
27	Yes	12	0.00000001	0.00006830
28	Yes	13	0.00000001	0.00009979
29	Yes	14	0.00000001	0.00006011
30	Yes	13	0.00000001	0.00007015
31	Yes	13	0.00000001	0.00008468
32	Yes	13	0.00000001	0.00011682
33	Yes	12	0.00000001	0.00007548
34	Yes	13	0.00000001	0.00013902
35	Yes	13	0.00000001	0.00009648
36	Yes	13	0.00000001	0.00006404

37	Yes	13	0.00000001	0.00013461
38	Yes	13	0.00000001	0.00008961

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	118 - 90	22.81	28	1.662	0.011
L2	90 - 81	13.37	28	1.467	0.008
L3	81 - 74	10.73	28	1.316	0.006
L4	74 - 68.75	8.89	28	1.188	0.005
L5	68.75 - 64.5	7.64	28	1.093	0.005
L6	64.5 - 60	6.70	28	1.024	0.004
L7	60 - 42	5.77	28	0.939	0.003
L8	42 - 34.5	2.74	28	0.653	0.002
L9	34.5 - 31	1.81	28	0.520	0.002
L10	31 - 30	1.46	28	0.452	0.001
L11	30 - 25.5	1.36	28	0.433	0.001
L12	25.5 - 23	0.99	28	0.364	0.001
L13	23 - 19	0.81	28	0.327	0.001
L14	19 - 1	0.56	28	0.269	0.001
L15	1 - 0	0.00	28	0.015	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
116.00	PCS 1900MHz 4x45W-65MHz	28	22.11	1.655	0.011	21376
114.00	APXVSPP18-C-A20 w/ Mount Pipe	28	21.40	1.649	0.011	21376
108.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	28	19.31	1.625	0.010	10688
98.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	28	15.92	1.559	0.009	5343
90.00	Bridge Stiffener (84" x 14.5" x 1.25")	28	13.37	1.467	0.008	3851
85.00	BXA-70063-6CF-2 w/ Mount Pipe	28	11.87	1.387	0.007	3394
80.00	KS24019-L112A	28	10.46	1.298	0.006	3129
73.00	VHLP1-23	28	8.65	1.169	0.005	3141
72.00	A-ANT-18G-2-C	28	8.40	1.150	0.005	3187
60.00	Bridge Stiffener (84" x 14.5" x 1.25")	28	5.77	0.939	0.003	3692
30.00	Bridge Stiffener (84" x 14.5" x 1.25")	28	1.36	0.433	0.001	3335

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	118 - 90	58.18	3	4.241	0.029
L2	90 - 81	34.11	3	3.744	0.020
L3	81 - 74	27.40	3	3.358	0.016
L4	74 - 68.75	22.71	3	3.032	0.014
L5	68.75 - 64.5	19.50	3	2.789	0.012
L6	64.5 - 60	17.10	3	2.615	0.010
L7	60 - 42	14.74	3	2.397	0.009
L8	42 - 34.5	6.99	3	1.667	0.005

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L9	34.5 - 31	4.63	3	1.328	0.004
L10	31 - 30	3.72	3	1.154	0.003
L11	30 - 25.5	3.48	3	1.107	0.003
L12	25.5 - 23	2.52	3	0.931	0.002
L13	23 - 19	2.06	3	0.836	0.002
L14	19 - 1	1.42	3	0.687	0.002
L15	1 - 0	0.00	9	0.039	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
116.00	PCS 1900MHz 4x45W-65MHz	3	56.39	4.225	0.028	8466
114.00	APXVSPP18-C-A20 w/ Mount Pipe	3	54.60	4.208	0.028	8466
108.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	3	49.26	4.147	0.026	4232
98.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	3	40.63	3.980	0.023	2114
90.00	Bridge Stiffener (84" x 14.5" x 1.25")	3	34.11	3.744	0.020	1523
85.00	BXA-70063-6CF-2 w/ Mount Pipe	3	30.29	3.540	0.018	1341
80.00	KS24019-L112A	3	26.70	3.312	0.016	1235
73.00	VHLP1-23	3	22.08	2.984	0.013	1239
72.00	A-ANT-18G-2-C	3	21.46	2.937	0.013	1257
60.00	Bridge Stiffener (84" x 14.5" x 1.25")	3	14.74	2.397	0.009	1452
30.00	Bridge Stiffener (84" x 14.5" x 1.25")	3	3.48	1.107	0.003	1307

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	118 - 90 (1)	P24x1/4	28.00	0.00	0.0	23.70	18.65	-7.59	442.00	0.017
L2	90 - 81 (2)	P24x3/8	9.00	0.00	0.0	25.20	27.83	-10.66	701.38	0.015
L3	81 - 74 (3)	P24x3/8 [0.518362]	7.00	0.00	0.0	24.80	38.24	-11.91	948.21	0.013
L4	74 - 68.75 (4)	P24x3/8 [0.671793]	5.25	0.00	0.0	21.59	49.23	-13.56	1063.11	0.013
L5	68.75 - 64.5 (5)	P24x3/8 [0.913699]	4.25	0.00	0.0	21.47	66.27	-14.67	1422.95	0.010
L6	64.5 - 60 (6)	P24x3/8 [0.878957]	4.50	0.00	0.0	24.80	63.84	-15.86	1583.27	0.010
L7	60 - 42 (7)	P30x3/8 [0.681709]	18.00	0.00	0.0	22.53	62.79	-21.20	1414.85	0.015
L8	42 - 34.5 (8)	P30x3/8 [0.799317]	7.50	0.00	0.0	22.48	73.33	-23.51	1648.24	0.014
L9	34.5 - 31 (9)	P30x3/8 [0.799319]	3.50	0.00	0.0	22.48	73.33	-24.59	1648.38	0.015
L10	31 - 30 (10)	P30x3/8 [0.869719]	1.00	0.00	0.0	22.41	79.59	-24.90	1783.58	0.014
L11	30 - 25.5 (11)	P36x3/8 [0.61883]	4.50	0.00	0.0	21.34	68.79	-26.67	1467.81	0.018
L12	25.5 - 23 (12)	P36x3/8 [0.674813]	2.50	0.00	0.0	21.19	74.89	-27.47	1586.82	0.017
L13	23 - 19 (13)	P36x3/8 [0.72742]	4.00	0.00	0.0	21.27	80.61	-28.84	1714.24	0.017
L14	19 - 1 (14)	P36x3/8 [0.882626] H1-3+VT (1.33 CR) - 14	18.00	0.00	0.0	21.08	97.38	-35.47	2052.77	0.017
L15	1 - 0 (15)	P36x3/8 [0.920946]	1.00	0.00	0.0	21.06	101.49	-35.80	2137.61	0.017

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	118 - 90 (1)	P24x1/4	227	24.83	23.70	1.048	0	0.00	23.70	0.000
L2	90 - 81 (2)	P24x3/8	369	27.34	27.72	0.986	0	0.00	27.72	0.000
L3	81 - 74 (3)	P24x3/8 [0.518362]	495	27.02	27.28	0.990	0	0.00	27.28	0.000
L4	74 - 68.75 (4)	P24x3/8 [0.671793]	596	25.61	23.75	1.078	0	0.00	23.75	0.000
L5	68.75 - 64.5 (5)	P24x3/8 [0.913699]	681	22.17	23.62	0.939	0	0.00	23.62	0.000
L6	64.5 - 60 (6)	P24x3/8 [0.878957]	772	26.01	27.28	0.954	0	0.00	27.28	0.000
L7	60 - 42 (7)	P30x3/8 [0.681709]	1158	30.87	24.79	1.245	0	0.00	24.79	0.000
L8	42 - 34.5 (8)	P30x3/8 [0.799317]	1325	30.49	24.73	1.233	0	0.00	24.73	0.000
L9	34.5 - 31 (9)	P30x3/8 [0.799319]	1404	32.32	24.73	1.307	0	0.00	24.73	0.000
L10	31 - 30 (10)	P30x3/8 [0.869719]	1427	30.40	24.65	1.233	0	0.00	24.65	0.000
L11	30 - 25.5 (11)	P36x3/8 [0.61883]	1532	30.73	23.47	1.309	0	0.00	23.47	0.000
L12	25.5 - 23 (12)	P36x3/8 [0.674813]	1590	29.39	23.31	1.261	0	0.00	23.31	0.000
L13	23 - 19 (13)	P36x3/8 [0.72742]	1685	29.02	23.39	1.240	0	0.00	23.39	0.000
L14	19 - 1 (14)	P36x3/8 [0.882626]	2122	30.51	23.19	1.316	0	0.00	23.19	0.000
L15	1 - 0 (15)	P36x3/8 [0.920946]	2147	29.68	23.17	1.281	0	0.00	23.17	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	118 - 90 (1)	P24x1/4	13.00	1.39	16.80	0.083	1	0.06	11.90	0.005
L2	90 - 81 (2)	P24x3/8	17.70	1.27	16.80	0.076	2	0.07	16.80	0.004
L3	81 - 74 (3)	P24x3/8 [0.518362]	18.21	0.95	16.53	0.058	2	0.06	16.53	0.003
L4	74 - 68.75 (4)	P24x3/8 [0.671793]	19.73	0.80	14.40	0.056	2	0.04	14.40	0.003
L5	68.75 - 64.5 (5)	P24x3/8 [0.913699]	20.06	0.61	14.31	0.042	2	0.03	14.31	0.002
L6	64.5 - 60 (6)	P24x3/8 [0.878957]	20.37	0.64	16.53	0.039	2	0.03	16.53	0.002
L7	60 - 42 (7)	P30x3/8 [0.681709]	22.06	0.70	15.02	0.047	2	0.03	15.02	0.002
L8	42 - 34.5 (8)	P30x3/8 [0.799317]	22.54	0.61	14.99	0.041	2	0.02	14.99	0.001
L9	34.5 - 31 (9)	P30x3/8 [0.799319]	22.72	0.62	14.99	0.041	2	0.02	14.99	0.001
L10	31 - 30 (10)	P30x3/8 [0.869719]	22.77	0.57	14.94	0.038	2	0.02	14.94	0.001
L11	30 - 25.5 (11)	P36x3/8 [0.61883]	23.37	0.68	14.23	0.048	2	0.02	14.23	0.001
L12	25.5 - 23 (12)	P36x3/8 [0.674813]	23.54	0.63	14.13	0.045	2	0.02	14.13	0.001
L13	23 - 19 (13)	P36x3/8 [0.72742]	23.80	0.59	14.18	0.042	2	0.02	14.18	0.001
L14	19 - 1 (14)	P36x3/8 [0.882626]	24.77	0.51	14.05	0.036	2	0.01	14.05	0.001
L15	1 - 0 (15)	P36x3/8 [0.920946]	24.81	0.49	14.04	0.035	2	0.01	14.04	0.001

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	118 - 90 (1)	0.017	1.048	0.000	0.083	0.005	1.073 ✔	1.333	H1-3+VT ✔
L2	90 - 81 (2)	0.015	0.986	0.000	0.076	0.004	1.008 ✔	1.333	H1-3+VT ✔
L3	81 - 74 (3)	0.013	0.990	0.000	0.058	0.003	1.007 ✔	1.333	H1-3+VT ✔
L4	74 - 68.75 (4)	0.013	1.078	0.000	0.056	0.003	1.095 ✔	1.333	H1-3+VT ✔
L5	68.75 - 64.5 (5)	0.010	0.939	0.000	0.042	0.002	0.951 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L6	64.5 - 60 (6)	0.010	0.954	0.000	0.039	0.002	0.965 ✔	1.333	H1-3+VT ✔
L7	60 - 42 (7)	0.015	1.245	0.000	0.047	0.002	1.263 ✔	1.333	H1-3+VT ✔
L8	42 - 34.5 (8)	0.014	1.233	0.000	0.041	0.001	1.249 ✔	1.333	H1-3+VT ✔
L9	34.5 - 31 (9)	0.015	1.307	0.000	0.041	0.001	1.324 ✔	1.333	H1-3+VT ✔
L10	31 - 30 (10)	0.014	1.233	0.000	0.038	0.001	1.249 ✔	1.333	H1-3+VT ✔
L11	30 - 25.5 (11)	0.018	1.309	0.000	0.048	0.001	1.330 ✔	1.333	H1-3+VT ✔
L12	25.5 - 23 (12)	0.017	1.261	0.000	0.045	0.001	1.280 ✔	1.333	H1-3+VT ✔
L13	23 - 19 (13)	0.017	1.240	0.000	0.042	0.001	1.259 ✔	1.333	H1-3+VT ✔
L14	19 - 1 (14)	0.017	1.316	0.000	0.036	0.001	1.335 ✘	1.333	H1-3+VT ✘
L15	1 - 0 (15)	0.017	1.281	0.000	0.035	0.001	1.299 ✔	1.333	H1-3+VT ✔

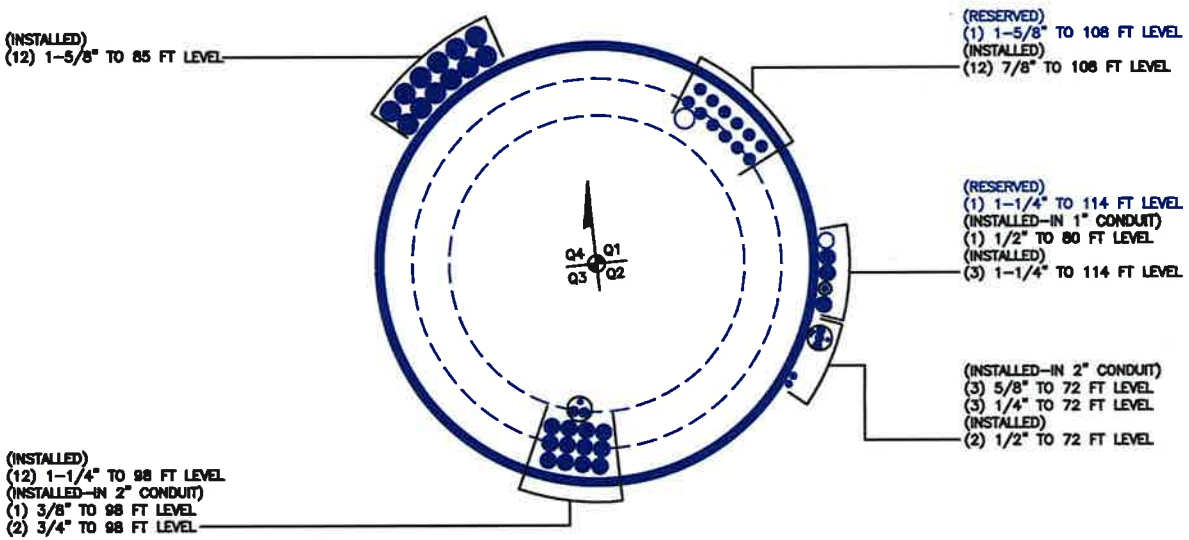
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	118 - 90	Pole	P24x1/4	1	-7.59	589.19	80.5	Pass
L2	90 - 81	Pole	P24x3/8	2	-10.66	934.94	75.6	Pass
L3	81 - 74	Pole	P24x3/8 [0.518362]	3	-11.91	1263.96	75.5	Pass
L4	74 - 68.75	Pole	P24x3/8 [0.671793]	4	-13.56	1417.13	82.1	Pass
L5	68.75 - 64.5	Pole	P24x3/8 [0.913699]	5	-14.67	1896.79	71.3	Pass
L6	64.5 - 60	Pole	P24x3/8 [0.878957]	6	-15.86	2110.50	72.4	Pass
L7	60 - 42	Pole	P30x3/8 [0.681709]	7	-21.20	1885.99	94.7	Pass
L8	42 - 34.5	Pole	P30x3/8 [0.799317]	8	-23.51	2197.10	93.7	Pass
L9	34.5 - 31	Pole	P30x3/8 [0.799319]	9	-24.59	2197.29	99.3	Pass
L10	31 - 30	Pole	P30x3/8 [0.869719]	10	-24.90	2377.51	93.7	Pass
L11	30 - 25.5	Pole	P36x3/8 [0.61883]	11	-26.67	1956.59	99.7	Pass
L12	25.5 - 23	Pole	P36x3/8 [0.674813]	12	-27.47	2115.23	96.1	Pass
L13	23 - 19	Pole	P36x3/8 [0.72742]	13	-28.84	2285.08	94.5	Pass
L14	19 - 1	Pole	P36x3/8 [0.882626]	14	-35.47	2736.34	**	Fail ✘
L15	1 - 0	Pole	P36x3/8 [0.920946]	15	-35.80	2849.43	97.5	Pass
						Summary		
						Pole (L14)	100.1	Fail ✘
						RATING =	**100.1**	**Fail ✘**

**See additional calculation for shaft capacities.

APPENDIX B

BASE LEVEL DRAWING


(INSTALLED)
(12) 1-5/8" TO 85 FT LEVEL
(RESERVED)
(1) 1-5/8" TO 108 FT LEVEL
(INSTALLED)
(12) 7/8" TO 108 FT LEVEL
(RESERVED)
(1) 1-1/4" TO 114 FT LEVEL
(INSTALLED-IN 1" CONDUIT)
(1) 1/2" TO 80 FT LEVEL
(INSTALLED)
(3) 1-1/4" TO 114 FT LEVEL
(INSTALLED-IN 2" CONDUIT)
(3) 5/8" TO 72 FT LEVEL
(3) 1/4" TO 72 FT LEVEL
(INSTALLED)
(2) 1/2" TO 72 FT LEVEL
(INSTALLED)
(12) 1-1/4" TO 98 FT LEVEL
(INSTALLED-IN 2" CONDUIT)
(1) 3/8" TO 98 FT LEVEL
(2) 3/4" TO 98 FT LEVEL
Q4
Q1
Q3
Q2

APPENDIX C

ADDITIONAL CALCULATIONS

Reinforced Pole Stress
and Effective Thickness Check

AeroSolutions LLC

Section	Elevation (ft)	Moment (k-ft)	Compression (kip)	Shear (kip)	Torsion (kip-ft)	Number of Sides	Pole OD	Thickness (in)	Yield Strength (ksi)	Flat Width (in)	Area (in²)	Moment of Inertia (in⁴)	Percent of Composite Moment of Inertia	Angle Offset to Pole Flat	Distance to Extreme Fiber (in)
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Section	Section Modulus (in³)	Torsion Constant (in⁴)	Compact Calculation	Allowable Bending Stress (ksi)	Allowable Bending Moment Strength (k-ft)	Allowable Axial Stress (ksi)	Allowable Shear Stress (ksi)	Unreinforced Pole: Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	Stress Ratio
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Section	Reinforced Pole: Moment in Pole w/ Reinforcement	Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	Reinforced Pole Stress Ratio	Reinforcement 1: Qty	Model	Position	Gap Between Pole and Back of Reinf. (in)	Tension only or Tension & Comp.	Total Moment of Inertia (in⁴)	Axial Force (kip)	Stress Ratio
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]								
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]								
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]								
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]								
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Section	Reinforcement 2: Qty	Model	Position	Gap Between Pole and Back of Reinf. (in)	Tension only or Tension & Comp.	Total Moment of Inertia (in⁴)	Axial Force (kip)	Stress Ratio	Composite: Centroid Offset (in)	Area (in²)	Moment of Inertia (in⁴)	Controlling Stress Ratio	Thickness (in)	Weight Multiplier	Standard Yield Stress (ksi)	% Error to Standard Yield Stress
1									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Rein1

Bottom	Top	Qty	Model	Position	T or T&C
0	1	16	L2.5x1.25-	F	T&C
1	30	3	BP1x10-18	F	T&C
30	31	6	PL5x1.25-	F	T&C
31	60	3	BP1x10-18	F	T&C
60	74	3	P0.75x9-12	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Flats (Used for relative orientation only. Actual flat numbers may vary.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
1	1	1															
1	1	1	1	1	1												
1	1	1															
1	1	1															

Rein2

Bottom	Top	Qty	Model	Position	T or T&C
1	19	3	MS-450	F	T&C
31	34.5	3	MS-400	F	T&C
60	64.5		MS-400	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

1	2	3
1	1	1
1	1	1

Rein3

Bottom	Top	Qty	Model	Position	T or T&C
1	23	2	FP-060100	F	T&C
23	25.5	2	FP-040075	F	T&C
34.5	42	3	FP-040075	F	T&C
60	68.75	3	FP-045100	F	T&C
74	81	3	FP-040075	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

1	2	3
1	1	
1	1	
1	1	1
1	1	1
1	1	1

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Dimensions and Properties														Compression				Axial					
																		ASD-9			LRFD		
Model	Weight (lb/ft)	Area (in^2)	Moment of Inertia (in^4)	Moment of Inertia (in^4)	Centroid from Mating Edge (in)	Centroid from Bolt Hole Center (in)	Web Thickness (in)	Width (in)	Flange Width (in)	Flange Thickness (in)	Hole Diameter (in)	Yield Stress (ksi)	Ultimate Stress (ksi)	Slender Ratio Coefficient	Unbraced Length (in)	Slender Ratio Coefficient	Unbraced Length (in)	Allowable Axial (kip)	Allowable Axial w/ increase (kip)	Governing Axial	Design Axial Strength (kip)	Governing Axial
MS-400	10.2	3.00	0.14	4.00	0.375	0	0.75	4	0	0	1.21875	65	80	0.80	16.875	1.00	16.875	80.9	107.8	Compress.	121.3	Compress.
MS-450	15.3	4.50	0.38	7.59	0.5	0	1	4.5	0	0	1.21875	65	80	0.80	20.625	1.00	20.625	127.6	170.2	Compress.	193.0	Compress.
CCI-XFP-040075	10.2	3.00	0.14	4.00	0.375	0	0.75	4	0	0	1.1875	65	80	0.80	16	1.00	16	82.5	110.0	Rupture	123.8	Rupture
CCI-XFP-045100	15.3	4.50	0.38	7.59	0.5	0	1	4.5	0	0	1.1875	65	80	0.80	20	1.00	20	129.7	172.9	Compress.	195.0	Rupture
CCI-XFP-060100	20.4	6.00	0.50	18.00	0.5	0	1	6	0	0	1.1875	65	80	0.80	16	1.00	16	189.3	252.3	Compress.	285.0	Rupture
BP1x10-18	34.0	10.00	1.19	81.93	0.3356	0	1	10	0	0	1.25	50	65	0.80	18	1.00	18	239.7	319.6	Rupture	359.5	Rupture
BP0.75x9-12	23.0	6.75	0.66	44.20	0.177	0	0.75	9	0	0	1.25	50	65	0.80	12	1.00	12	155.4	207.2	Rupture	233.1	Rupture
PL2.5x1.25-	10.6	3.13	1.63	0.41	1.25	0	2.5	1.25	0	0	0	65	80	0.80	0	1.00	0	121.9	162.5	Compress.	182.8	Compress.
PL5x1.25-	21.3	6.25	13.02	0.81	2.5	0	5	1.25	0	0	0	65	80	0.80	0	1.00	0	243.8	325.0	Compress.	365.6	Compress.

Flange Bolt Information for TIA/EIA-222-F and TIA-222-G-2

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Information	
ID #:	876331
Name:	NEW BRITAIN GRAVEL PIT
App. #:	260703 R0

Flange Height:	90	ft

System Reactions		
Moment:	226.8	kip-ft
Axial:	7.6	kip
Shear:	13.0	kip

Pole Geometry		
Upper Pole OD:	24.00	in
Upper Pole Thick:	0.2500	in
Lower Pole OD:	24.00	in
Lower Pole Thick:	0.3750	in
Flange Plate OD:	32.00	in

Design Information	
TIA Code:	F
ASIF:	1.33
Failure At:	100%

Outer Bolt Group Data		
Quantity:		
Diameter:	1	in
Material:	A325	
Bolt Circle:	29.00	in
Bolt Group Area:	0.00	in²
Bolt Group MOIx:	0	in⁴

Reactions Seen by Outer Bolt Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Outer Bolt Capacity Check		
Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	23.0	kip
Bolt Capacity	0.0%	

Inner Bolt Group Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in²
Bolt Group MOIx:	0	in⁴

Reactions Seen by Inner Bolt Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Inner Bolt Capacity Check		
Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

Bridge Stiffener #1 Data		
Quantity:	3	
Type:	Write In	
Circle:	40.20	in
Individual Area:	10.63	in²
BS #1 Group Area:	31.88	in²
BS #1 Group MOIx:	6439	in⁴

Reactions Seen by BS #1 Group		
Moment:	226.8	kip-ft
Axial:	0.0	kip
Shear:	13.0	kip

BS #1 Capacity Check		
Max Tension:	90.3	kip
Max Compression:	45.1	kip
Allowable Axial:	552.3	kip
Max Shear:	4.3	kip
Allowable Shear:	276.2	kip
Bolt Capacity	16.3%	Pass

BS #1 Upper Weld Capacity		
Eccentricity (ex):	8.100	in
Weld Length (l):	29.0	in
Weld Factor (a):	0.279	
Weld Size (D):	6	16TH
Weld Coef. (C):	1.19	
Electrode Coef. (C_1):	1.00	
Weld Capacity:	32.8%	Pass

BS #1 Lower Weld Capacity		
Eccentricity (ex):	8.100	in
Weld Length (l):	49.8	in
Weld Factor (a):	0.163	
Weld Size (D):	6	16TH
Weld Coef. (C):	1.48	
Electrode Coef. (C_1):	1.00	
Weld Capacity:	15.3%	Pass

Bridge Stiffener #2 Data		
Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in²
BS #2 Group Area:	0.00	in²
BS #2 Group MOIx:	0	in⁴

Reactions Seen by BS #2 Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #2 Capacity Check		
Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

BS #2 Upper Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

BS #2 Lower Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

Bridge Stiffener #3 Data		
Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in²
BS #3 Group Area:	0.00	in²
BS #3 Group MOIx:	0	in⁴

Reactions Seen by BS #3 Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #3 Capacity Check		
Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

BS #3 Upper Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

BS #3 Lower Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

Rev.4.1

Flange Bolt Information for TIA/EIA-222-F and TIA-222-G-2

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Information	
ID #:	876331
Name:	NEW BRITAIN GRAVEL PIT
App. #:	260703 R0

Flange Height:	60	ft

System Reactions		
Moment:	771.8	kip-ft
Axial:	15.9	kip
Shear:	20.4	kip

Pole Geometry		
Upper Pole OD:	24.00	in
Upper Pole Thick:	0.3750	in
Lower Pole OD:	30.00	in
Lower Pole Thick:	0.3750	in
Flange Plate OD:	41.00	in

Design Information	
TIA Code:	F
ASIF:	1.33
Failure At:	100%

Outer Bolt Group Data		
Quantity:		
Diameter:	1.5	in
Material:	A325	
Bolt Circle:	35.00	in
Bolt Group Area:	0.00	in²
Bolt Group MOIx:	0	in⁴

Reactions Seen by Outer Bolt Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Outer Bolt Capacity Check		
Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	51.8	kip
Bolt Capacity	0.0%	

Inner Bolt Group Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in²
Bolt Group MOIx:	0	in⁴

Reactions Seen by Inner Bolt Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Inner Bolt Capacity Check		
Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

Bridge Stiffener #1 Data		
Quantity:	3	
Type:	Write In	
Circle:	49.20	in
Individual Area:	10.63	in²
BS #1 Group Area:	31.88	in²
BS #1 Group MOIx:	9645	in⁴

Reactions Seen by BS #1 Group		
Moment:	520.6	kip-ft
Axial:	0.0	kip
Shear:	13.4	kip

BS #1 Capacity Check			
Max Tension:	169.3	kip	
Max Compression:	84.6	kip	
Allowable Axial:	552.3	kip	
Max Shear:	2.9	kip	
Allowable Shear:	276.2	kip	
Bolt Capacity	30.7%		Pass

BS #1 Upper Weld Capacity			
Eccentricity (ex):	12.600	in	
Weld Length (l):	32.9	in	
Weld Factor (a):	0.383		
Weld Size (D):	6	16TH	
Weld Coef. (C):	0.97		
Electrode Coef. (C_1):	1.00		
Weld Capacity:	66.4%		Pass

BS #1 Lower Weld Capacity			
Eccentricity (ex):	9.600	in	
Weld Length (l):	44.9	in	
Weld Factor (a):	0.214		
Weld Size (D):	6	16TH	
Weld Coef. (C):	1.35		
Electrode Coef. (C_1):	1.00		
Weld Capacity:	34.8%		Pass

Bridge Stiffener #2 Data		
Quantity:	3	
Type:	Write In	
Circle:	47.50	in
Individual Area:	5.50	in²
BS #2 Group Area:	16.50	in²
BS #2 Group MOIx:	4654	in⁴

Reactions Seen by BS #2 Group		
Moment:	251.2	kip-ft
Axial:	0.0	kip
Shear:	6.9	kip

BS #2 Capacity Check			
Max Tension:	84.6	kip	
Max Compression:	42.3	kip	
Allowable Axial:	285.9	kip	
Max Shear:	0.8	kip	
Allowable Shear:	143.0	kip	
Bolt Capacity	29.6%		Pass

BS #2 Upper Weld Capacity			
Eccentricity (ex):	11.750	in	
Weld Length (l):	23.3	in	
Weld Factor (a):	0.505		
Weld Size (D):	6	16TH	
Weld Coef. (C):	0.78		
Electrode Coef. (C_1):	1.00		
Weld Capacity:	58.3%		Pass

BS #2 Lower Weld Capacity			
Eccentricity (ex):	8.750	in	
Weld Length (l):	19.6	in	
Weld Factor (a):	0.446		
Weld Size (D):	6	16TH	
Weld Coef. (C):	0.86		
Electrode Coef. (C_1):	1.00		
Weld Capacity:	62.4%		Pass

Bridge Stiffener #3 Data		
Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in²
BS #3 Group Area:	0.00	in²
BS #3 Group MOIx:	0	in⁴

Reactions Seen by BS #3 Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #3 Capacity Check		
Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

BS #3 Upper Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

BS #3 Lower Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

Rev.4.1

Flange Bolt Information for TIA/EIA-222-F and TIA-222-G-2

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Information	
ID #:	876331
Name:	NEW BRITAIN GRAVEL PIT
App. #:	260703 R0

Flange Height:	30	ft

System Reactions		
Moment:	1427.0	kip-ft
Axial:	24.9	kip
Shear:	22.8	kip

Design Information	
TIA Code:	F
ASIF:	1.33
Failure At:	100%

Pole Geometry		
Upper Pole OD:	30.00	in
Upper Pole Thick:	0.3750	in
Lower Pole OD:	36.00	in
Lower Pole Thick:	0.3750	in
Flange Plate OD:	47.00	in

Outer Bolt Group Data		
Quantity:		
Diameter:	1.5	in
Material:	A325	
Bolt Circle:	41.00	in
Bolt Group Area:	0.00	in²
Bolt Group MOIx:	0	in⁴

Reactions Seen by Outer Bolt Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Outer Bolt Capacity Check		
Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	51.8	kip
Bolt Capacity	0.0%	

Inner Bolt Group Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in²
Bolt Group MOIx:	0	in⁴

Reactions Seen by Inner Bolt Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Inner Bolt Capacity Check		
Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

Bridge Stiffener #1 Data		
Quantity:	3	
Type:	Write In	
Circle:	55.20	in
Individual Area:	10.63	in²
BS #1 Group Area:	31.88	in²
BS #1 Group MOIx:	12141	in⁴

Reactions Seen by BS #1 Group		
Moment:	960.1	kip-ft
Axial:	0.0	kip
Shear:	15.0	kip

BS #1 Capacity Check			
Max Tension:	278.3	kip	
Max Compression:	139.1	kip	
Allowable Axial:	552.3	kip	
Max Shear:	3.3	kip	
Allowable Shear:	276.2	kip	
Bolt Capacity	50.4%		Pass

BS #1 Upper Weld Capacity			
Eccentricity (ex):	12.600	in	
Weld Length (l):	44.9	in	
Weld Factor (a):	0.281		
Weld Size (D):	6	16TH	
Weld Coef. (C):	1.18		
Electrode Coef. (C_1):	1.00		
Weld Capacity:	65.5%		Pass

BS #1 Lower Weld Capacity			
Eccentricity (ex):	9.600	in	
Weld Length (l):	32.9	in	
Weld Factor (a):	0.292		
Weld Size (D):	6	16TH	
Weld Coef. (C):	1.16		
Electrode Coef. (C_1):	1.00		
Weld Capacity:	91.4%		Pass

Bridge Stiffener #2 Data		
Quantity:	3	
Type:	Write In	
Circle:	53.50	in
Individual Area:	5.50	in²
BS #2 Group Area:	16.50	in²
BS #2 Group MOIx:	5903	in⁴

Reactions Seen by BS #2 Group		
Moment:	466.9	kip-ft
Axial:	0.0	kip
Shear:	7.8	kip

BS #2 Capacity Check			
Max Tension:	139.6	kip	
Max Compression:	69.8	kip	
Allowable Axial:	285.9	kip	
Max Shear:	0.9	kip	
Allowable Shear:	143.0	kip	
Bolt Capacity	48.8%		Pass

BS #2 Upper Weld Capacity			
Eccentricity (ex):	11.750	in	
Weld Length (l):	32.3	in	
Weld Factor (a):	0.364		
Weld Size (D):	6	16TH	
Weld Coef. (C):	1.00		
Electrode Coef. (C_1):	1.00		
Weld Capacity:	53.9%		Pass

BS #2 Lower Weld Capacity			
Eccentricity (ex):	8.750	in	
Weld Length (l):	27.9	in	
Weld Factor (a):	0.314		
Weld Size (D):	6	16TH	
Weld Coef. (C):	1.11		
Electrode Coef. (C_1):	1.00		
Weld Capacity:	56.5%		Pass

Bridge Stiffener #3 Data		
Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in²
BS #3 Group Area:	0.00	in²
BS #3 Group MOIx:	0	in⁴

Reactions Seen by BS #3 Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #3 Capacity Check			
Max Tension:	0.0	kip	
Max Compression:	0.0	kip	
Allowable Axial:	0.0	kip	
Max Shear:	0.0	kip	
Allowable Shear:	0.0	kip	
Bolt Capacity	0.0%		

BS #3 Upper Weld Capacity			
Eccentricity (ex):	N/A	in	
Weld Length (l):	N/A	in	
Weld Factor (a):	N/A		
Weld Size (D):	N/A	16TH	
Weld Coef. (C):	N/A		
Electrode Coef. (C_1):	N/A		
Weld Capacity:	N/A		

BS #3 Lower Weld Capacity			
Eccentricity (ex):	N/A	in	
Weld Length (l):	N/A	in	
Weld Factor (a):	N/A		
Weld Size (D):	N/A	16TH	
Weld Coef. (C):	N/A		
Electrode Coef. (C_1):	N/A		
Weld Capacity:	N/A		

Rev.4.1

Anchor Rod Information for TIA/EIA-222-F and TIA-222-G-2

Site Information	
ID:	876331
Name:	NEW BRITAIN GRAVEL PIT
App. #:	260703 R0

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Base Reactions		
Moment:	2147	ft-kip
Axial:	36	kip
Shear:	25	kip
Base Plate Type:	Circular	

Design Information	
TIA Code:	F
ASIF:	1.333
Failure:	100%
eta Factor:	0.50

Original Anchor Rod Data		
Quantity:	16	
Diameter:	1.50	in
Material:	A354 GR BC	
Bolt Circle:	41.0	in
Bolt Spacing:		in
Bolt Group Area:	28.27	in^2
Bolt Group MOIx:	5944	in^4

Reactions Seen by Original AR Group		
Moment:	821.4	kip-ft
Axial:	35.8	kip
Shear:	24.8	kip

Original AR Capacity Check		
Tension Load:	56.1	kip
Allowable load:	97.2	kip
AR Capacity:	57.7%	Pass

First Added Anchor Rod Data		
Quantity:	4	
Diameter:	1.75	in
Material:	A772	
Bolt Circle:	51.5	in
Bolt Group Area:	9.62	in^2
Bolt Group MOIx:	3074	in^4

Reactions Seen by First Added AR Group		
Moment:	424.7	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

First Added AR Capacity Check		
Tension Load:	93.3	kip
Allowable load:	158.7	kip
AR Capacity:	58.8%	Pass

Second Added Anchor Rod Data		
Quantity:	4	
Diameter:	2.25	in
Material:	A193 B7	
Bolt Circle:	57.3	in
Bolt Group Area:	15.90	in^2
Bolt Group MOIx:	6517	in^4

Reactions Seen by Second Added AR Group		
Moment:	900.6	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check		
Tension Load:	186.6	kip
Allowable load:	218.6	kip
AR Capacity:	85.3%	Pass

Third Added Anchor Rod Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Second Added AR Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check		
Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

Rev.4.1

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

TIA Rev F

Site Data

BU#: *876331*
Site Name: *NEW BRITAIN GRAVEL PI*
App #: *260703 R0*

Pole Manufacturer:	*Other*

Reactions		
Moment:	821.35295	ft-kips
Axial:	35.8011	kips
Shear:	24.80617	kips

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

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

Plate Data		
Diam:	47	in
Thick:	2	in
Grade:	36	ksi
Single-Rod B-eff:	7.07	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Both	
Groove Depth:	0.5	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.25	in
Width:	6	in
Height:	18	in
Thick:	1.25	in
Notch:	0.75	in
Grade:	65	ksi
Weld str.:	70	ksi

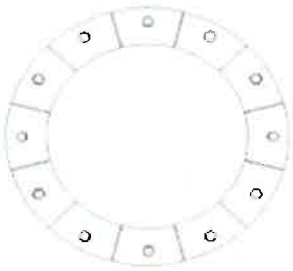
Pole Data		
Diam:	36	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Base Plate Results	Flexural Check	Stiffened
Base Plate Stress:	19.9 ksi	Service, ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	55.2% Pass	Y.L. Length: N/A, Roark

Stiffener Results	
Horizontal Weld :	33.5% Pass
Vertical Weld:	30.0% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	2.4% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	15.2% Pass
Plate Comp. (AISC Bracket):	14.9% Pass

Pole Results	
Pole Punching Shear Check:	7.9% 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

APPENDIX D

MODIFICATION DRAWINGS

PREPARED FOR CROWN CASTLE

MONOPOLE REINFORCEMENT DRAWINGS

SITE NAME: **NEW BRITAIN GRAVEL PIT**

BU NUMBER: **876331**

SITE ADDRESS:
115 NORTH MOUNTAIN RD
NEW BRITAIN, CT 06053
HARTFORD COUNTY

PROJECT CONTACTS

1 CROWN TOWER STRUCTURAL ANALYST
David Smith
724-416-4955
David.Smith@crowncastle.com
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

2 CROWN PROJECT MANAGER
Jerry Bruno
781-970-0069
Jerry.Bruno.Contractor@crowncastle.com

3 AERO DESIGN ENGINEER (EOR)
Shraddha Dharia, P.E.
720-304-6882
rfq@aerosolutionsllc.com
5500 FLATIRON PKWY, SUITE 100
BOULDER, CO 80301

TOWER INFORMATION

TOWER MANUFACTURER:	ROHN	
TOWER HEIGHT/TYPE:	118 FT	MONOPOLE TOWER
TOWER LOCATION:	LAT: 41.6766	
	LONG: -72.8214	
APPLICATION ID:	260703 R0	

CODE COMPLIANCE

THIS REINFORCEMENT DESIGN IS BASED ON THE REQUIREMENTS OF TIA STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES USING

TIA CODE: TIA/EIA-222-F
WIND SPEED NO ICE: 80 MPH FASTEST MILE WIND SPEED
ICE THICKNESS: 1"
WIND SPEED WITH ICE: 38 MPH
SERVICE LOADS: 50 MPH

DRAWINGS INCLUDED

SHEET NUMBER	DESCRIPTION
S-1	TITLE PAGE
S-2	MODIFICATION INSPECTION CHECKLIST
S-3	NOTES
S-4	AJAX/DTI BOLT SPECIFICATIONS AND TIGHTENING PROCEDURE
S-5	ELEVATION
S-6 - S-8	DETAILS
S-9	FAB DETAILS

NO.	DATE	DESCRIPTION	BY
01	9/25/14	ADDED ADDITIONAL SCOPE	MB
00	9/17/14	INITIAL RELEASE	ZNG

REVISIONS

PREPARED FOR CROWN CASTLE

STATE OF CONNECTICUT · SHRADDHA A. DHARIA · No. 29167 · LICENSED PROFESSIONAL ENGINEER

9.26.2014

AeroSolutions LLC
Optimizing Your Tower Infrastructure

SITE NAME: NEW BRITAIN GRAVEL PIT
BU NUMBER: 876331
WO NUMBER: 926771
SITE ADDRESS:
115 NORTH MOUNTAIN RD
NEW BRITAIN, CT 06053
HARTFORD COUNTY

ENG/QA BY: BU	DATE: 9/25/2014
DFT BY: ZNG	DATE: 9/25/2014
DFT/QA BY: BU	DATE: 9/25/2014
APRV'D BY: SD	DATE: 9/25/2014
SCALE: N.T.S.	

TITLE PAGE

S-1 REV 01

MODIFICATION INSPECTION NOTES

MI CHECKLIST

CONSTRUCTION / INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
PRE-CONSTRUCTION	
X	MI CHECKLIST DRAWING
X	EOR APPROVAL
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE PER ENG-SOW-10033
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
None	
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	CONTRACTORS CERTIFIED WELD INSPECTION AND NDE REPORTS
NA	EARTHWORK LIFT AND DENSITY
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS BUILT DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS:	
None	
POST CONSTRUCTION	
X	MI INSPECTOR RED-LINE OR RECORD DRAWING (S)
X	POST INSTALLED ANCHOR ROD PULL OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	
None	

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

GENERAL

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

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

ALL MI'S SHALL BE CONDUCTED BY A CROWN ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN. SEE CROWN ENG-BUL-10173, "APPROVED MI VENDORS".

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 PURCHASE ORDER (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 POINT OF CONTACT (POC).

REFER TO CROWN ENG-SOW-10007, "MODIFICATION INSPECTION SOW", FOR FURTHER DETAILS AND REQUIREMENTS.

MI INSPECTOR

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

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

THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL 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.

GENERAL CONTRACTOR

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

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

THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND CROWN ENG-SOW-10007.

RECOMMENDATIONS

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

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

CANCELLATION OR DELAYS IN SCHEDULED MI

IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN 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, NOR FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC.). IF CROWN CONTRACTS DIRECTLY FOR A THIRD PARTY MI, EXCEPTIONS MAY BE MADE IN THE EVENT THAT THE DELAY/CANCELLATION IS CAUSED BY WEATHER OR OTHER CONDITIONS THAT MAY COMPROMISE THE SAFETY OF THE PARTIES INVOLVED.

CORRECTION OF FAILING MI'S

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

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

MI VERIFICATION INSPECTIONS

CROWN RESERVES THE RIGHT TO CONDUCT AN MI VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MI INSPECTION(S) ON TOWER MODIFICATION PROJECTS.

ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH CROWN ENG-SOW-10007.

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 " " OR " " REPORT FOR THE ORIGINAL PROJECT.

REQUIRED PHOTOS

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

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

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

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO CROWN ENG-SOW-10007.

NO.	DATE	DESCRIPTION	BY
		REVISIONS	
01	9/25/14	ADDED ADDITIONAL SCOPE	MB
00	9/17/14	INITIAL RELEASE	ZNG

PREPARED FOR CROWN CASTLE

STATE OF CONNECTICUT — ANNEGRETA A. DRANKA — LICENSED PROFESSIONAL ENGINEER
9.26.2014

AeroSolutions LLC
Optimizing Your Tower Infrastructure

SITE NAME: NEW BRITAIN GRAVEL PIT
BU NUMBER: 876331
WO NUMBER: 926771
SITE ADDRESS:
115 NORTH MOUNTAIN RD
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APRVD BY: SD	DATE: 9/25/2014
SCALE: N.T.S.	

MODIFICATION INSPECTION CHECKLIST

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GENERAL NOTES

1. ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE. THE CONTRACTOR MUST BE EXPERIENCED IN THE PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED HEREIN. BY ACCEPTANCE OF THIS ASSIGNMENT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED, THAT HE IS PROPERLY LICENSED, AND THAT HE IS PROPERLY REGISTERED TO DO THIS WORK IN THE STATE AND/OR COUNTY IN WHICH IT IS TO BE PERFORMED.

2. THE GENERAL NOTES AND TYPICAL DETAILS ARE APPLICABLE TO ALL PARTS OF THE STRUCTURE AND SHALL BE READ IN CONJUNCTION WITH THE STRUCTURAL DRAWINGS AND PROJECT SPECIFICATIONS.

3. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING APPROVALS FROM ALL AUTHORITIES HAVING JURISDICTION FOR THIS PROJECT AND SHALL NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY, OR CITY) ENGINEER 24 HOURS PRIOR TO THE BEGINNING OF CONSTRUCTION.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.

5. ERECT GUARDS AND BARRIERS PER APPLICABLE LABOR AND CONSTRUCTION SAFETY REGULATIONS.

6. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, POSSIBLE INTERFERENCES, AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO THE ENGINEER OF RECORD (EOR) AND FIELD PERSONNEL IMMEDIATELY. ANY AND ALL FIELD CHANGES SHALL BE APPROVED AND DOCUMENTED BY THE EOR PRIOR TO FIELD IMPLEMENTATION.

7. ALL MATERIALS AND WORKMANSHIP SHALL BE WARRANTED FOR TWO (2) YEARS FROM THE DATE OF COMPLETED CONSTRUCTION.

8. USE ONLY THE LATEST ISSUES OF ANY APPLICABLE CODES, STANDARDS, OR REGULATIONS MENTIONED IN THE FOLLOWING NOTES AND SPECIFICATIONS, UNO.

9. ALL WORKMANSHIP SHALL BE IN ACCORDANCE WITH ANSI, ASTM, ACI, TIA, AND AISC STANDARDS AS REFERENCED IN THE APPLICABLE CODE.

10. STRUCTURAL ELEMENTS SHOWN ON THESE DRAWINGS ARE DESIGNED IN ACCORDANCE WITH APPLICABLE BUILDING CODES/STANDARDS. ALL CONSTRUCTION, EXCEPT WHERE NOTED OTHERWISE, SHALL COMPLY WITH THOSE CODES/STANDARDS.

11. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS, AND IN CONFORMANCE WITH THE DRAWINGS. ANY AND ALL SUBSTITUTIONS MUST BE DULY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER OF RECORD PRIOR TO FABRICATION AND INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.

12. ALL MANUFACTURER'S HARDWARE ASSEMBLY INSTRUCTIONS SHALL BE FOLLOWED EXACTLY AND SHALL SUPERSEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.

13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ENSURING THAT ALL CONSTRUCTION PROCEDURES MEET THE REQUIREMENTS OF OSHA, THE OWNER, AND ALL OTHER APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY REGULATIONS.

14. ACCESS TO THE PROPOSED WORK SITE MAY BE RESTRICTED. THE CONTRACTOR SHALL COORDINATE INTENDED CONSTRUCTION ACTIVITY, INCLUDING WORK SCHEDULE AND MATERIAL ACCESS, WITH THE RESIDENT LEASING AGENT.

15. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SAFEGUARD ALL EXISTING STRUCTURES OR BURIED SERVICES AFFECTED BY THIS CONSTRUCTION. CONTRACTOR IS ALSO RESPONSIBLE FOR TEMPORARILY RELOCATING ANY LINES OR STRUTS AS NECESSARY TO COMPLETE THE REQUIRED WORK.

16. STRUCTURAL DESIGN IS FOR THE COMPLETE CONDITION ONLY. THE CONTRACTOR MUST BE COGNIZANT THAT THE REMOVAL OF ANY STRUCTURAL COMPONENT OF AN EXISTING TOWER HAS THE POTENTIAL TO CAUSE THE PARTIAL OR COMPLETE COLLAPSE OF THE STRUCTURE. ALL NECESSARY PRECAUTIONS MUST BE TAKEN TO ENSURE STRUCTURAL INTEGRITY, INCLUDING, BUT NOT LIMITED TO, ENGINEERING ASSESSMENT OF CONSTRUCTION STRESSES WITH INSTALLATION MAXIMUM WIND SPEED AND/OR TEMPORARY BRACING AND SHORING.

17. DO NOT SCALE DRAWINGS.

18. FOR THIS ANALYSIS AND MODIFICATION, THE TOWER HAS BEEN ASSUMED TO BE IN GOOD CONDITION WITHOUT ANY DEFECTS. IF THE CONTRACTOR DISCOVERS ANY INDICATION OF AN EXISTING STRUCTURAL DEFECT, CONTACT THE ENGINEER OF RECORD IMMEDIATELY.

19. MODIFICATION WORK SHALL BE COMPLETED IN CALM WIND CONDITIONS / OR APPROPRIATE WIND SPEED FOR THE TYPE OF MODIFICATION WORK TO BE INSTALLED.

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

STRUCTURAL STEEL NOTES

1. DESIGN, FABRICATION, ERECTION, ALTERATION AND MAINTENANCE SHALL CONFORM TO THE FOLLOWING, UNLESS NOTED OTHERWISE (UNO)
   A. TIA-222: STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS
   B. TIA-1019-A: INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS
   C. AISC MANUAL OF STEEL CONSTRUCTION

2. ALL STRUCTURAL ELEMENTS SHALL CONFORM TO THE FOLLOWING REQUIREMENTS, UNO.
   A. STRUCTURAL STEEL, ASTM A572 GRADE 65 (FY = 65KSI).
   B. ALL BOLTS, ASTM A325 TYPE 1 GALVANIZED HIGH STRENGTH BOLTS.
   C. ALL NUTS, ASTM A563 CARBON AND ALLOY STEEL NUTS.
   D. ALL WASHERS, ASTM F436 HARDENED STEEL WASHERS.

3. HOLES SHALL NOT BE FLAME CUT THRU STEEL UNLESS APPROVED BY THE ENGINEER OF RECORD.

4. ALL FASTENERS SHALL NOT BE REUSED.

5. A NUT LOCKING DEVICE SHALL BE INSTALLED ON ALL PROPOSED AND/OR REPLACED ASTM A325 BOLTS.

6. ALL PROPOSED AND/OR REPLACED BOLTS SHALL BE OF SUFFICIENT LENGTH SUCH THAT THE END OF THE BOLT BE AT LEAST FLUSH WITH THE FACE OF THE NUT. IT IS NOT PERMITTED FOR THE BOLT END TO BE BELOW THE FACE OF THE NUT AFTER TIGHTENING IS COMPLETED.

7. HOT-DIP GALVANIZE ALL ITEMS, UNO.
   GALVANIZE PER ASTM A123, ASTM A153/A153M OR ASTM A653 G90, AS APPLICABLE.

8. FOR A LIST OF CROWN APPROVED COLD GALVANIZING COMPOUNDS, REFER TO CROWN ENG-BUL-10149, "TOWER PROTECTIVE COATINGS BULLETIN".

9. AFTER FINAL INSPECTION, ALL EXPOSED STRUCTURAL STEEL AS THE RESULT OF THIS SCOPE OF WORK INCLUDING WELDS, FIELD DRILLED HOLES, AND SHAFT INTERIORS (WHERE ACCESSIBLE), SHALL BE CLEANED AND COLD GALVANIZING APPLIED BY BRUSH IN ACCORDANCE WITH CROWN ENG-BUL-10149, "TOWER PROTECTIVE COATINGS BULLETIN". PHOTO DOCUMENTATION IS REQUIRED TO BE SUBMITTED TO THE MI INSPECTOR.

WELDING NOTES

1. ALL WELDING SHALL BE IN ACCORDANCE WITH THE AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE-STEEL".

2. ALL WELDING SHALL BE PERFORMED BY AWS CERTIFIED WELDERS.

3. ALL ARC WELDING ON CROWN STRUCTURES SHALL BE DONE IN ACCORDANCE WITH THE CROWN ENG-PLN-10015, "CUTTING AND WELDING SAFETY PLAN" AND AWS D1.1 (LATEST EDITION). THIS SHALL INCLUDE A CERTIFIED WELDING INSPECTOR (CWI) FOR ACCEPTANCE OR REJECTION OF ALL WELDING OPERATIONS, PRE-DURING-POST, USING THE ACCEPTANCE CRITERIA OF AWS D1.1. THE CWI SHALL WORK WITH THE GC ON THE LEVEL OF INTERACTION NEEDED TO CONDUCT THE WELDING INSPECTION. THE CERTIFIED WELDING INSPECTION IS THE RESPONSIBILITY OF THE GC.

4. FOR ALL WELDING, USE E80XX-ELECTRODES FOR SMAW PROCESS AND E8XT-XX ELECTRODES FOR FCAW PROCESS, UNO.

5. SURFACES TO BE WELDED SHALL BE FREE FROM SCALE, SLAG, RUST, MOISTURE, GREASE OR ANY OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING. GRIND THE SURFACE ADJACENT TO THE WELD FOR A DISTANCE OF 2" MINIMUM ALL AROUND. ENSURE BOTH AREAS ARE 100% FREE OF ALL GALVANIZING.

6. DO NOT WELD IF THE TEMPERATURE OF THE STEEL IN THE VICINITY OF THE WELD AREA IS BELOW 0° F. WHEN THE TEMPERATURE IS BETWEEN 0° F AND 32° F, PREHEAT AND MAINTAIN THE STEEL IN THE VICINITY OF THE WELD AREA AT 70° F DURING THE WELDING PROCESS.

7. DO NOT WELD ON WET OR FROST-COVERED SURFACES & PROVIDE ADEQUATE PROTECTION FROM HIGH WINDS.

8. 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. 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.

DETAIL DRAWINGS SHALL GOVERN OVER ANY VARIANCE FROM THIS SHEET

NO.	DATE	DESCRIPTION	BY
01	9/25/14	ADDED ADDITIONAL SCOPE	MB
00	9/17/14	INITIAL RELEASE	ZNG

REVISIONS

PREPARED FOR CROWN CASTLE

STATE OF CONNECTICUT
GUANGCHUN A. ZHANG
No. 29107
LICENSED
PROFESSIONAL ENGINEER

9.26.2014

AeroSolutions LLC
Designing Your Town Infrastructure

SITE NAME: NEW BRITAIN GRAVEL PIT
BU NUMBER: 876331
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SITE ADDRESS:
115 NORTH MOUNTAIN RD
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ENG/QA BY: BU	DATE: 9/25/2014
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SCALE: N.T.S.	

NOTES

S-3 REV 01

AJAX/DTI BOLT SPECIFICATIONS AND TIGHTENING PROCEDURE

M20 AJAX/DTI BOLT ASSEMBLY COMPONENT SPECIFICATIONS:

BOLT:
AJAX ONESIDE™ BLIND BOLT (M8.8; EQUIVALENT TO A325)
FINISH: HOT DIP GALVANIZED PER ASTM A153.

SPLIT WASHER:
AJAX ONESIDE™ SPLIT WASHER
FINISH: HOT DIP GALVANIZED PER ASTM A153.

SHEAR SLEEVE:
Fu = 120 KSI MIN. (ASTM A519)
29MM O.D. x 20MM I.D.
LENGTH = NOMINAL [GRIP-6MM] = [GRIP-0.25"] (TOL. -0", +1/32")
SLEEVES SHALL BE ROUND, WITH ENDS CUT SQUARE AND DEBURRED.
FINISH: GALVANIZED (COLD GALVANIZED AS PER CROWN ENG-BUL-10149, HOT DIP GALVANIZED PER ASTM A123, MECHANICALLY GALVANIZED AND SPUN) OR CADMIUM PLATED.

SOLID WASHER:
AJAX ONESIDE™ SOLID WASHER
FINISH: HOT DIP GALVANIZED PER ASTM A153.

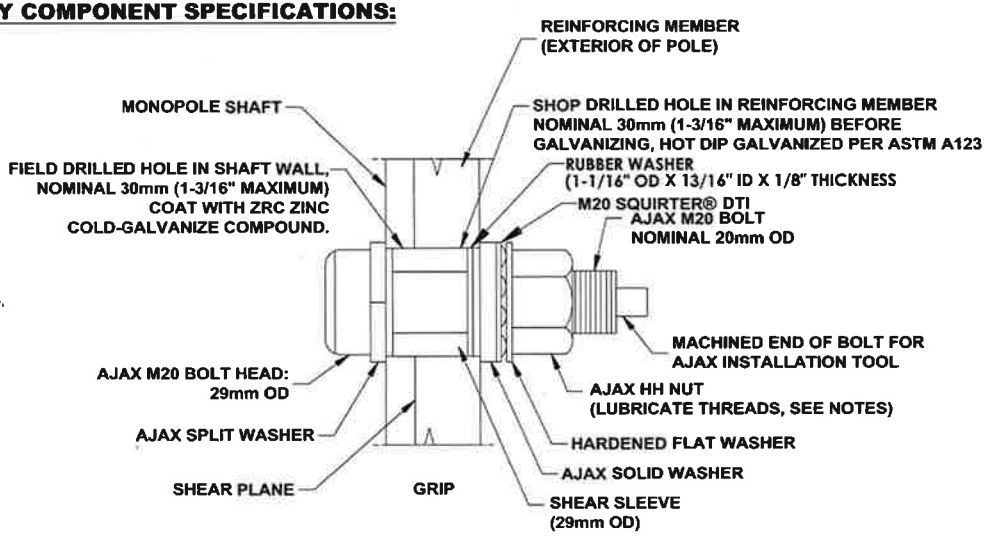
DIRECT TENSION INDICATOR WASHER:
SQUIRTER® DTI, ASTM F959M
FINISH: COLD MECHANICALLY GALVANIZED (TO ASTM B695) AND EPOXY COATED.

MANUFACTURER:
APPLIED BOLTING TECHNOLOGY PRODUCTS, INC.
1413 ROCKINGHAM ROAD, BELLOWS FALLS, VERMONT, USA 05101
PHONE: 1-800-552-1999
WEBSITE: WWW.APPLIEDBOLTING.COM

DISTRIBUTORS OF SQUIRTER® DTI'S:
http://www.appliedbolting.com/applied-bolting-distributors.html

FLAT WASHER:
HARDENED FLAT WASHER, ASTM F436M (MINIMUM HARDNESS RC38)
FINISH: COLD MECHANICALLY GALVANIZED

HEX NUT:
AJAX ONESIDE™ HEAVY HEX NUT
FINISH: HOT DIP GALVANIZED PER ASTM A153.



DETAIL 1: M20 AJAX/DTI BOLT ASSEMBLY

BOLT ASSEMBLY AND INSTALLATION:
BOLT ASSEMBLY SHALL ADHERE TO THE REQUIREMENTS OF DETAIL 1.
NON-PETROLEUM BASED, WATER SOLUBLE, INERT BOLT LUBRICANT SHALL BE USED ON ALL AJAX BOLTS TO ENSURE PROPER TENSIONING OF THE ASSEMBLY. CARE SHOULD BE TAKEN TO ENSURE THE BOLT HEAD AND SPLIT WASHER ARE NOT LUBRICATED AS THIS MAY CAUSE EXCESSIVE BOLT SLIPPAGE UPON APPLYING TORQUE, WHICH MAY LEAD TO DIFFICULTIES IN ENGAGING THE SQUIRTER® DTI WASHER PROPERLY. NOTE: ONLY LUBRICATING THE THREADS OF THE NUT MAY ACHIEVE BETTER RESULTS.
THE TYPICAL RULE OF THUMB WHEN USING AN IMPACT WRENCH IS TO ENGAGE FOR NO MORE THAN 10 SECONDS. IF THE BOLT IS NOT SPINNING AND THE SQUIRTER HAVE NOT ENGAGED AFTER 10 SECONDS USING AN IMPACT WRENCH, REMOVE THE NUT AND REAPPLY LUBRICANT. NOTE: PROLONGED USE OF THE IMPACT WRENCH TENDS TO HEAT THE BOLT THREAD/NUT, THEREBY, INCREASING FRICTION ON THE THREADS WHICH WOULD REQUIRE ADDITIONAL TORQUE. HOLDING FOR LONGER THAN 10 SECONDS CAN BE COUNTERPRODUCTIVE.

A MINIMUM OF 4 OUT OF 5 SQUIRTER® DTI "BUMPS" SHALL BE ENGAGED IN ANY AJAX/DTI BOLT ASSEMBLY IN THE END CONNECTION OF REINFORCING MEMBERS. INTERMEDIATE BOLTS SHALL ENGAGE A MINIMUM OF 3 OUT OF 5 SQUIRTER® DTI "BUMPS".

DTI WASHERS MUST BE PLACED DIRECTLY AGAINST THE OUTER AJAX WASHER WITH THE "BUMPS" FACING AWAY FROM THE AJAX WASHER. PLACE A HARDENED WASHER BETWEEN THE DTI AND THE AJAX NUT. THE DTI "BUMPS" SHALL BEAR AGAINST THE UNDERSIDE OF A HARDENED FLAT WASHER, NEVER DIRECTLY AGAINST THE NUT.

FOLLOW THE DTI MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION, LUBRICATION, TIGHTENING, AND INSPECTION.

INSPECTION:
VISUALLY INSPECT ALL BOLT ASSEMBLIES TO ENSURE THE MINIMUM "BUMP" ENGAGEMENT AS DEFINED IN THE SECTION "BOLT ASSEMBLY AND INSTALLATION" HAS BEEN ACHIEVED. FOR MORE INFORMATION ON INSPECTION, SEE THE MANUFACTURER'S GUIDELINES.
WHERE FEASIBLE, CHECK A SAMPLE OF THE END CONNECTION DTI WASHERS WITH THE APPROPRIATE FEELER GAGE. IF THE FEELER GAGE CANNOT BE INSERTED TO THE BOLT SHANK HALF WAY AROUND THE BOLT, THE INSTALLATION IS OKAY. IF YOU CAN INSERT THE FEELER GAGE TO THE SHANK ALL THE WAY AROUND THE BOLT, THE INSTALLATION IS NOT OKAY. IF YOU FIND MORE THAN ONE SUCH "NOT OKAY" BOLT IN ANY ONE END CONNECTION, CHECK ALL BOLTS IN THAT END CONNECTION. A MINIMUM OF THREE BOLTS SHALL BE CHECKED IN EACH END CONNECTION. PHOTOS SHALL BE TAKEN TO INDICATE THE BOLTS TESTED.

ALL BOLT ASSEMBLIES AND DTI WASHERS SHALL BE VISUALLY INSPECTED. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE PHOTO DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THE CONDITION OF THE DTI WASHERS.

NO.	DATE	DESCRIPTION	BY
01	9/25/14	ADDED ADDITIONAL SCOPE	MB
00	9/17/14	INITIAL RELEASE	ZNG

REVISIONS

PREPARED FOR CROWN CASTLE

STATE OF CONNECTICUT · BRANDON A. DIVIRA · LICENSED PROFESSIONAL ENGINEER

9.26.2014

AeroSolutions LLC

SITE NAME: NEW BRITAIN GRAVEL PIT
BU NUMBER: 876331
WO NUMBER: 926771
SITE ADDRESS:
115 NORTH MOUNTAIN RD
NEW BRITAIN, CT 06053
HARTFORD COUNTY

ENG/QA BY: BU	DATE: 9/25/2014
DFT BY: ZNG	DATE: 9/25/2014
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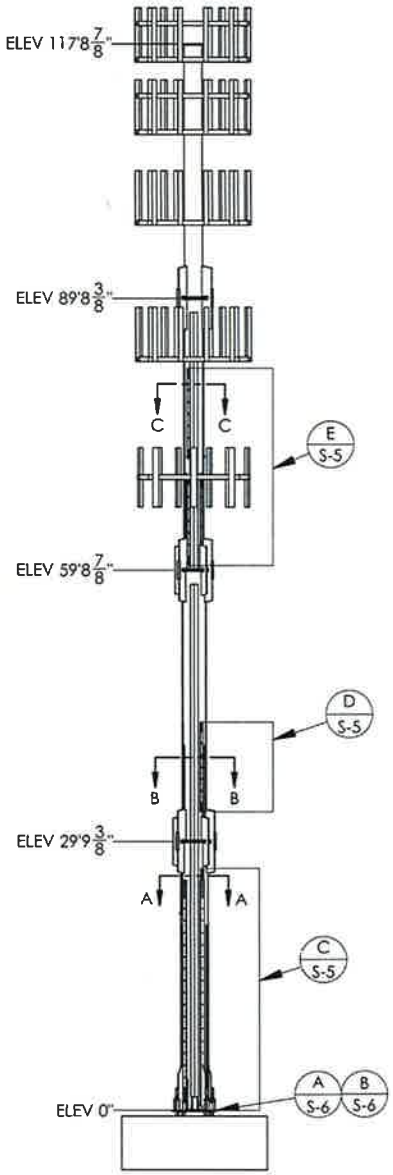
APRV'D BY: SD	DATE: 9/25/2014
SCALE: N.T.S.	

AJAX/DTI BOLT SPECIFICATIONS AND TIGHTENING PROCEDURE

S-4 REV 01



POLE SPECIFICATIONS

POLE SHAPE TYPE: ROUND POLE
SHAFT STEEL: A572-42
BASE PL STEEL: 36 KSI YIELD STRENGTH
ANCHOR RODS: 1.5 INCH A354 GR BC

SHAFT SECTION DATA

SHAFT SECTION	SECTION LENGTH	PLATE THICKNE	LAP SPLICE
1	28.00	P24x1/4	0.00
2	30.00	P24x3/8	0.00
3	30.00	P30x3/8	0.00
4	30.00	P36x3/8	0.00

POLE MODIFICATION SCHEDULE

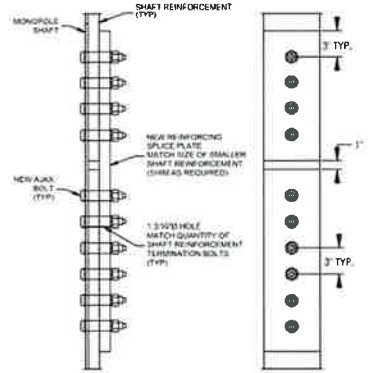
	ELEVATION (FT)	MODIFICATION	REFERENCE SHEET
A	0	Anchor Rods	S-6
B	0	Transition Stiffeners	S-5
C	0.5-26.5	Shaft Reinforcement	S-5
D	33-43	Shaft Reinforcement	S-5
E	60.25-82	Shaft Reinforcement	S-5

CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE

BOTTOM ELEVATION (FT)	TOP ELEVATION (FT)	PART NUMBER	FLAT/DEGREE ()	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAX INTERMEDIATE BOLT SPACING	AJAX BOLT QUANTITY PER PLATE	STEEL WEIGHT PER PLATE	TOTAL AJAX BOLT QUANTITY	TOTAL STEEL WEIGHT (BLACK)
0.5	25.5	CCI-WAFP-06010025	35	N/A	10	1'-4"	26	510	26	510
0.5	25.5	CCI-AFP-06010025	135	10	10	1'-4"	34	510	34	510
25.5	26.5	CUSTOM-SFP-04007501	35	N/A	4	1'-4"	4	10.2	4	10.2
21.5	26.5	CUSTOM-SFP-04007505	145	4	4	1'-4"	10	51	10	51
33	43	CCI-SFP-04007510	38, 158, 278	4	4	1'-4"	13	102	39	306
60.25	70.25	CCI-SFP-04510010	55, 175, 295	6	6	1'-8"	16	153	48	459
72	82	CCI-SFP-04007510	(3) Equally Spaced	4	4	1'-4"	13	102	39	306
									200	2152.2

NOTES FOR CROWN REINFORCING (65 KSI) MATERIAL:

1 DO NOT WELD WITHOUT APPROVAL FROM THE EOR.
2 SHIMS FOR MONOPOLE REINFORCEMENT MEMBER SHALL BE REQUIRED WHERE GAPS BETWEEN THE POLE SHAFT AND REINFORCING MEMBER EXIST AT FASTENER LOCATIONS. FOR INTERMEDIATE CONNECTIONS, THE MINIMUM SHIM LENGTH AND WIDTH SHALL BE THE WIDTH OF THE REINFORCING MEMBER. FOR TERMINATION CONNECTIONS, A CONTINUOUS SHIM PLATE (PREFERRED) OR EQUIVALENT INDIVIDUAL SHIM PLATES THE WIDTH OF THE REINFORCING MEMBER MAY BE USED. SHIM THICKNESS SHALL BE NO LESS THAN 1/16". STACKING OF SHIMS IS PERMITTED.
3 ALL FLAT PLATE REINFORCEMENT IS TO BE INSTALLED CENTERED ON ITS DESIGNATED FLAT, UNO.
4 SEE CMRP 65 KSI PARTS CATALOG 2nd EDITION FOR PART DETAILS.
5 AS AN ALTERNATIVE TO USING DTI WASHERS, AJAX BOLTS MAY BE PRETENSIONED PER THE AISC TURN-OF-NUT METHOD.
6 ON MULTISIDED POLES, EXISTING SAFETY CLIMB IS CONSIDERED FLAT 1 THEN FLATS ARE NUMBERED COUNTER CLOCKWISE.
7 CLIMBING PEGS TO BE RELOCATED AS REQUIRED.



REINFORCING SPLICE PLATE DETAIL

NO.	DATE	DESCRIPTION	BY
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00	9/17/14	INITIAL RELEASE	ZNG

REVISIONS

PREPARED FOR CROWN CASTLE

STATE OF CONNECTICUT · JOSHUA A. DUNHAM · No. 28187 · LICENSED PROFESSIONAL ENGINEER

9.26.2014

AeroSolutions LLC
Optimizing Your Tower Infrastructure

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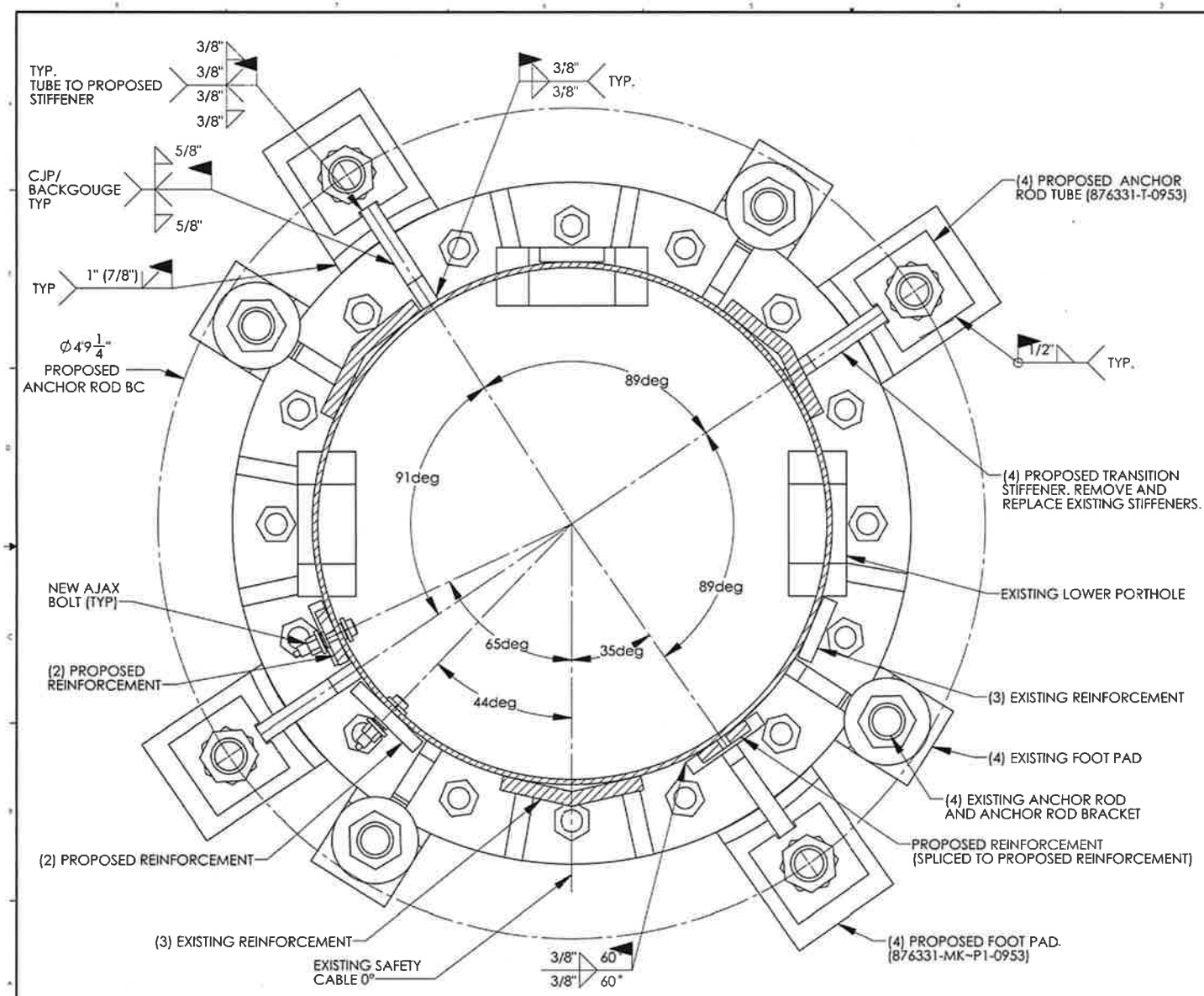
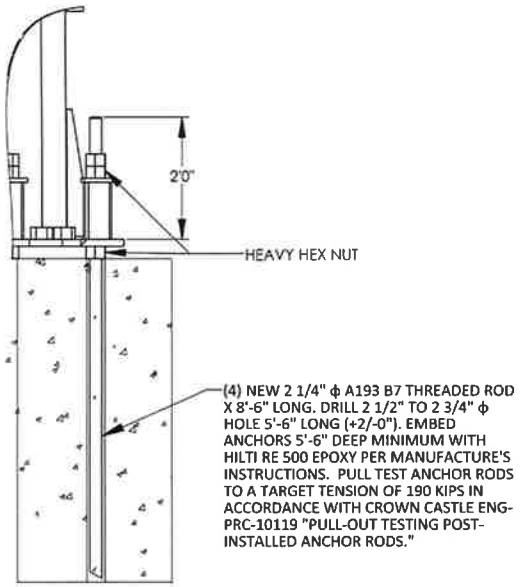
ELEVATION

S-5 REV 01



SECTION A-A



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REVISIONS

PREPARED FOR CROWN CASTLE

STATE OF CONNECTICUT
GWENDOLYN A. BUTLER
No. 28187
LICENSED
PROFESSIONAL ENGINEER
9.26.2014

AeroSolutions LLC
Optimizing Your Tower Investments

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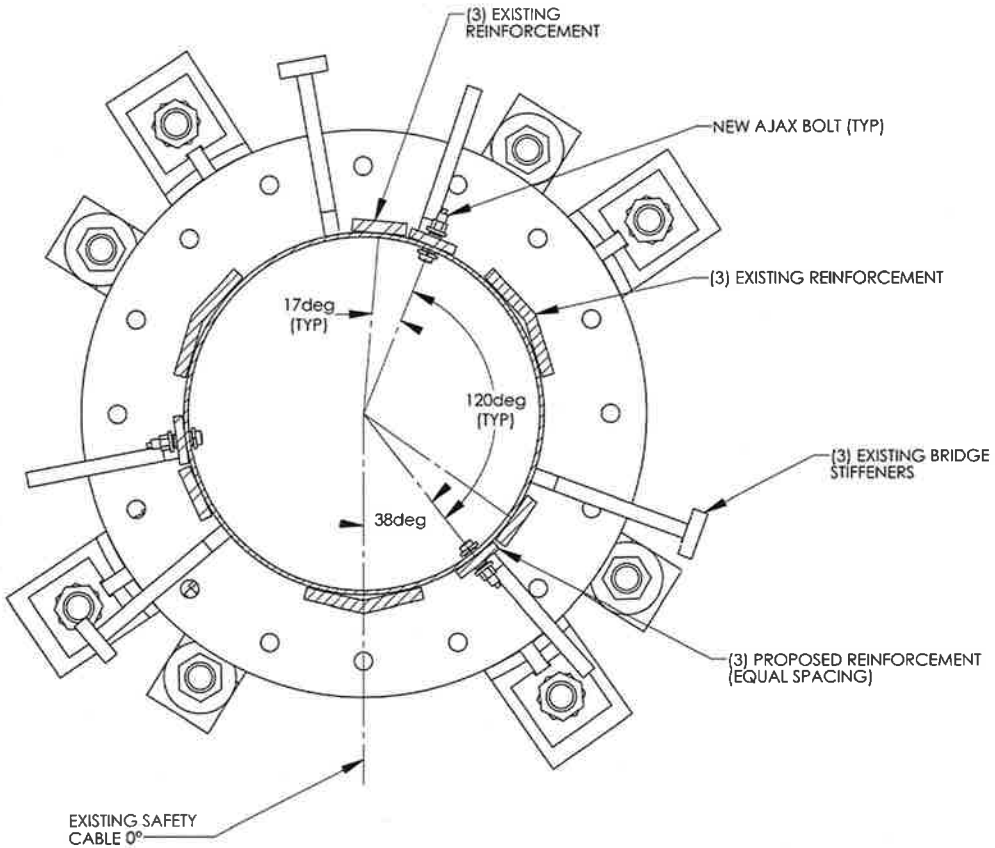
DETAILS

S-6 REV 01



SECTION B-B

NO.	DATE	DESCRIPTION	BY
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REVISIONS

PREPARED FOR CROWN CASTLE

STATE OF CONNECTICUT
BRANDON A. DRAKE
No. 29187
LICENSED PROFESSIONAL ENGINEER
9.26.2014

AeroSolutions LLC
Optimizing Your Tower Infrastructure

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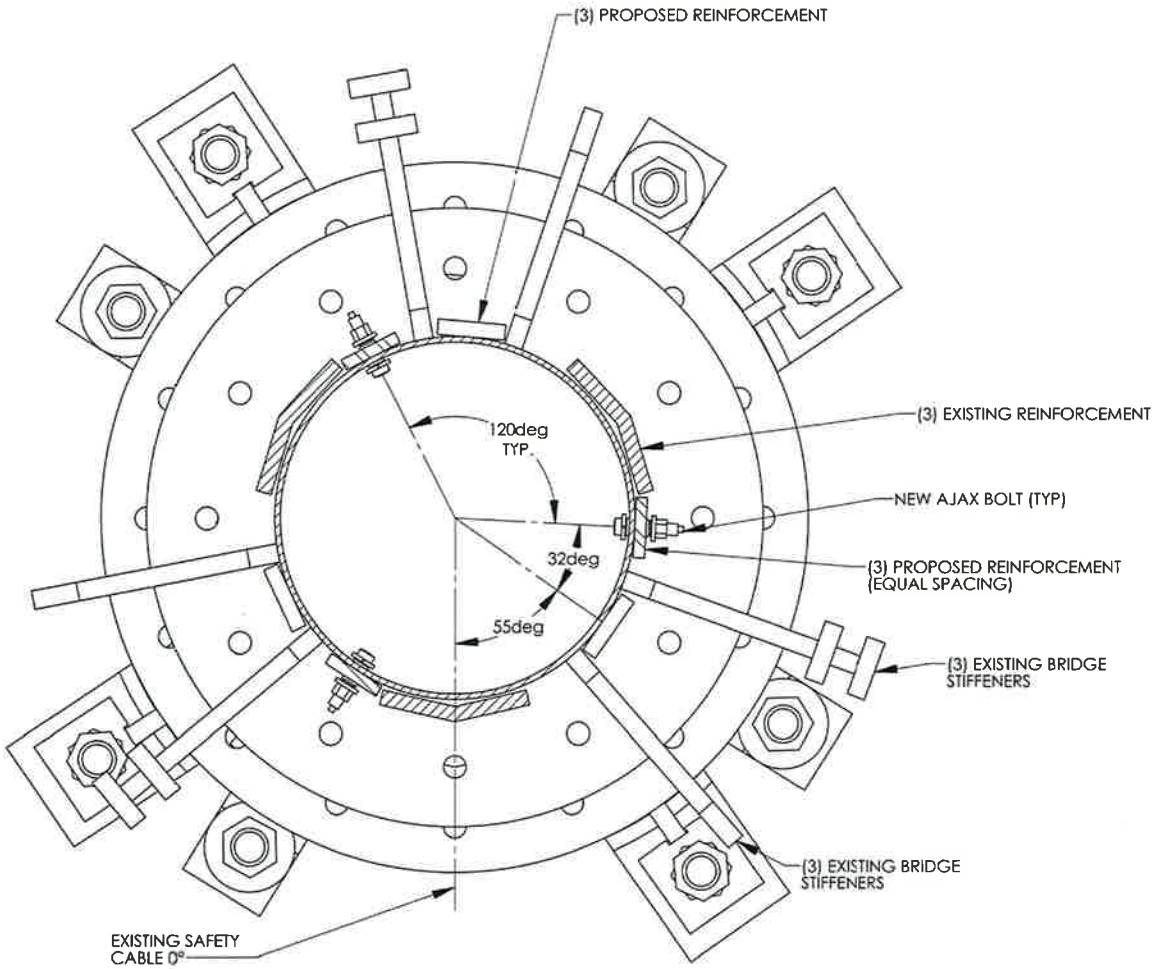
DETAILS

S-7 REV 01



SECTION C-C

NO.	DATE	DESCRIPTION	BY
01	9/25/14	ADDED ADDITIONAL SCOPE	MB
00	9/17/14	INITIAL RELEASE	ZNG

REVISIONS

PREPARED FOR CROWN CASTLE

STATE OF CONNECTICUT · BRADDON A. BRYANT · No. 29497 · LICENSED PROFESSIONAL ENGINEER

9.26.2014

AeroSolutions LLC
Optimizing Your Tower Infrastructure

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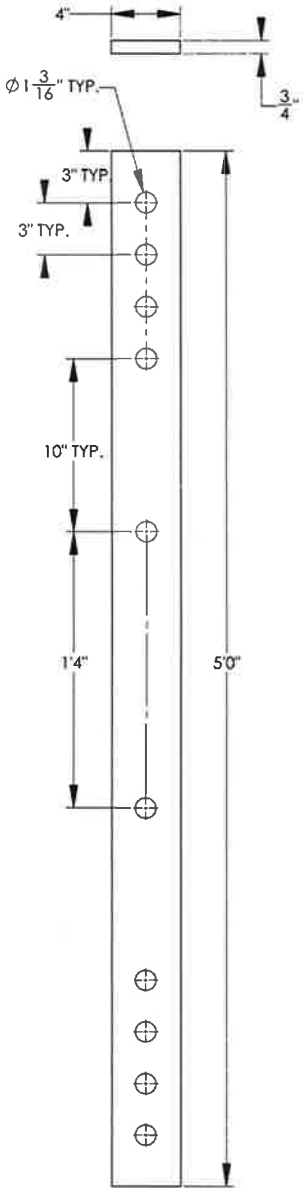
DETAILS

S-8 REV 01



CUSTOM-SFP-04007505
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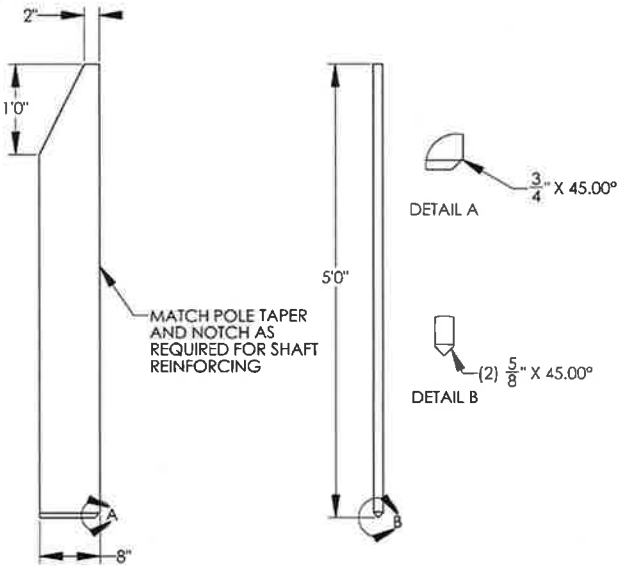

MK ~ TS1
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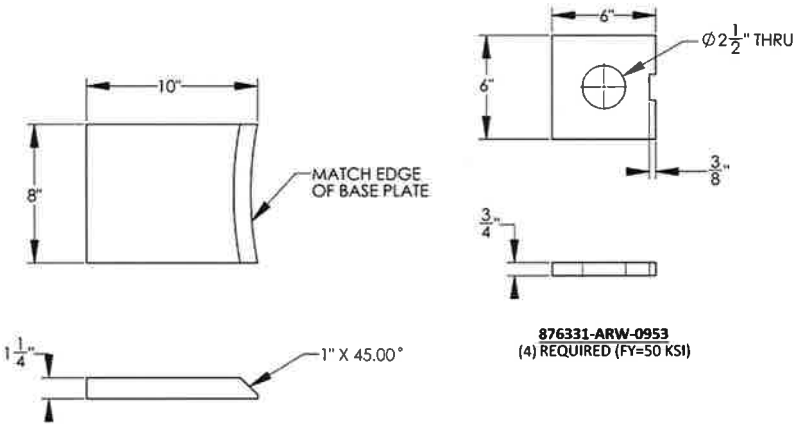

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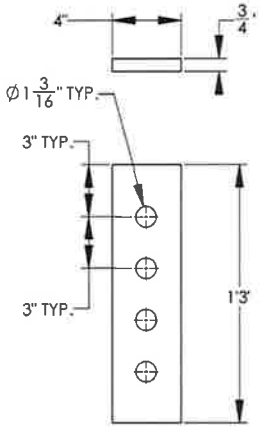
(4) REQUIRED (FY=50 KSI)

876331-ARW-0953
(4) REQUIRED (FY=50 KSI)



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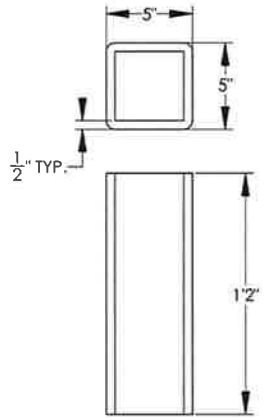

876331-T-0953
(4) REQUIRED (FY=42 KSI)

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REVISIONS

PREPARED FOR CROWN CASTLE

STATE OF CONNECTICUT · VIRGINIA A. BIANCHI · No. 28187 · LICENSED PROFESSIONAL ENGINEER

9.26.2014

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FAB DETAILS

S-9 REV 01