Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

June 24, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
798 Toby Hill Road, Westbrook, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 140-foot level of the existing 150-foot tower at 798 Toby Hill Road in Westbrook, Connecticut (the "Property"). The tower is owned by Crown Castle. The Council approved Cellco's use of the existing tower in 2009. Cellco now intends to modify its facility by replacing nine (9) of its existing antennas with two (2) model LNX-8513DS-VTM, 850 MHz antennas; one (1) model LNX-6514DS-VTM, 850 MHz antenna; three (3) model HBXX-6517DS-VTM, 1900 MHz antennas; and three (3) model HBXX-6517DS-VTM, 2100 MHz antennas, all at the same 140-foot level. Cellco also intends to install six (6) new remote radio heads ("RRHs") and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Noel Bishop, First Selectman of the Town of Westbrook. A copy of this letter is also being sent to Toby Hill Farm LLC, 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. The replacement antennas and RRHs will be located at the 140-foot level on the 150-foot tower.

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

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

4. The operation of the 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. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Noel Bishop, Westbrook First Selectman
Toby Hill Farm LLC
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

LNX-8513DS-VTM

Andrew® Teletilt® Antenna, 698–896 MHz, 85° horizontal beamwidth, RET compatible

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	14.6	15.3
Beamwidth, Horizontal, degrees	85	85
Beamwidth, Vertical, degrees	12.2	11.0
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	17
Front-to-Back Ratio at 180°, dB	25	26
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°

Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm | 72.7 in x 11.9 in x 7.1 in
Net Weight	17.8 kg | 39.2 lb
Model with factory installed AISG 2.0 RET	LNX-8513DS-A1M

Product Specifications

COMMSCOPE®

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Horizontal Tolerance, degrees	±3	±3
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°

Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm | 72.7 in x 11.9 in x 7.1 in
Net Weight	17.6 kg | 38.8 lb
Model with factory installed AISG 2.0 RET	LNX-6514DS-A1M

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

HBXX-6517DS-VTM

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

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	19.0	19.1	19.2
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	21	22	21
CPR at Sector, dB	10	11	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°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

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	0 ° | 18.4	0 ° | 18.7
	3 ° | 18.7	3 ° | 18.7	3 ° | 18.9
	6 ° | 18.4	6 ° | 18.5	6 ° | 18.6
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
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

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® quad
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz

Product Specifications

HBXX-6517DS-VTM

Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	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

Dimensions

Depth	166.0 mm | 6.5 in
Length	1903.0 mm | 74.9 in
Width	305.0 mm | 12.0 in
Net Weight	19.5 kg | 43.0 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M
RET System	Teletilt®

Regulatory Compliance/Certifications

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

Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

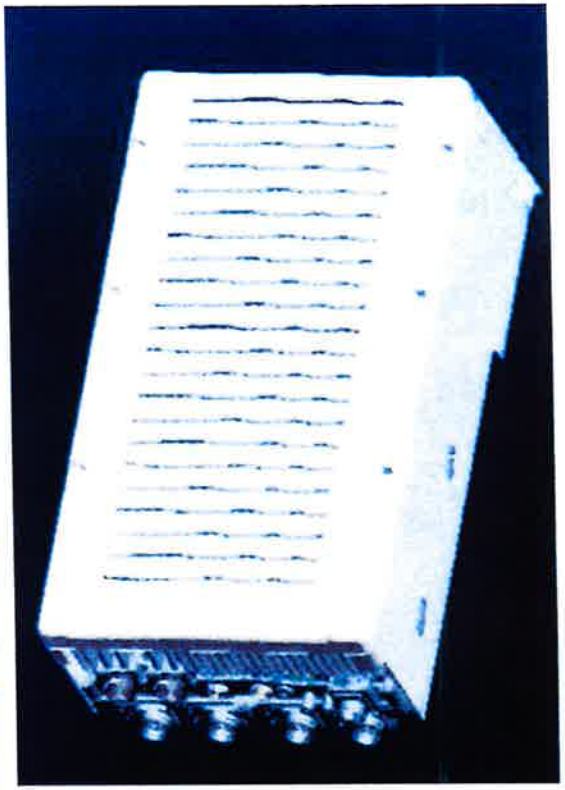
	RRH2x60
RF Output Power	2x60W
Instantaneous Bandwidth	20MHz
Transmitter	2 TX
Receiver 1900 HW version 1900A HW version	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features	AISG 2.0 for RET/TMA
	Internal Smart Bias-T
Power	-48VDC
CPRI Ports	2 CPRI Rate 3 Ports
External Alarms	4 External User Alarms
Monitor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

** Not a Verizon Wireless deployed product

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**

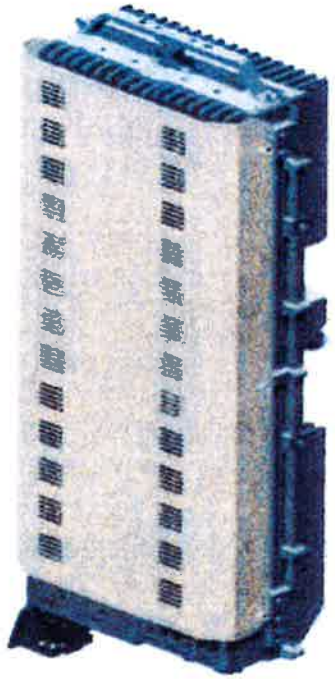


**- Includes solar shield but not mounting brackets (8 lbs.)

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.

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.

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).

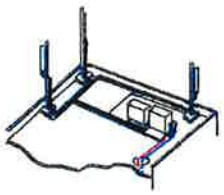
The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

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.

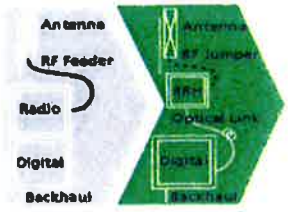
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

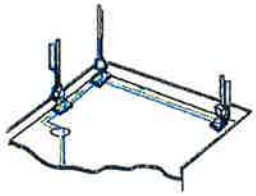
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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)

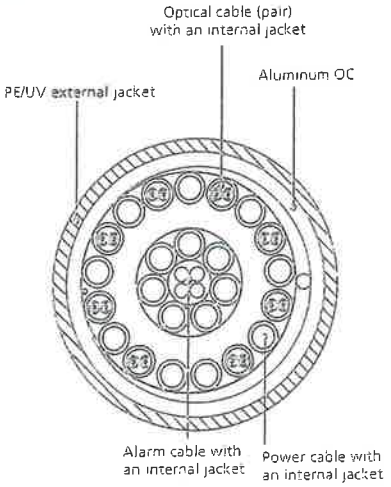


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Westbrook NE								
Tower Height: 150Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T GSM	1	283	130	0.0060	880	0.5867	1.03%	
*AT&T GSM	4	525	130	0.0447	1900	1.0000	4.47%	
*AT&T UMTS	2	565	130	0.0240	880	0.5867	4.10%	
*AT&T UMTS	2	875	130	0.0372	1900	1.0000	3.72%	
*AT&T LTE	1	1313	130	0.0279	740	0.4933	5.66%	
*Sprint CDMA/LTE	2	693	152	0.0216	1900	1.0000	2.16%	
*Sprint CDMA/LTE	1	390	152	0.0061	850	0.5667	1.07%	
Verizon PCS	**11**	**402**	**140**	**0.0811**	**1970**	**1.0000**	**8.11%**	
Verizon Cellular	**9**	**365**	**140**	**0.0603**	**869**	**0.5793**	**10.40%**	
Verizon AWS	**1**	**2832**	**140**	**0.0520**	**2145**	**1.0000**	**5.20%**	
Verizon 700	**1**	**814**	**140**	**0.0149**	**746**	**0.4973**	**3.00%**	
								48.92%
* Source: Siting Council								

ATTACHMENT 3

Date: **April 24, 2015**

Andrew Bazinet
Crown Castle
3 Corporate Park Drive
Clifton Park, NY 12065
(585) 370-4766

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
(919) 661-6351
crown@tepgroup.net

Subject: Structural Modification Analysis Report

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	118026
	Carrier Site Name:	Westbrook NE
Crown Castle Designation:	**Crown Castle BU Number:**	876384
	Crown Castle Site Name:	Westbrook / Orsina
	Crown Castle JDE Job Number:	290847
	Crown Castle Work Order Number:	1042367
	Crown Castle Application Number:	244207 Rev.3
Engineering Firm Designation:	**TEP Project Number:**	25589.31758
Site Data:	**798 Toby Hill Road, Westbrook, Middlesex County, CT 06498** **Latitude *41° 19' 12.70"*, Longitude *-72° 26' 32.20"*** **150 Foot - Monopole Tower**	

Dear Andrew Bazinet,

Tower Engineering Professionals is pleased to submit this **"Structural Modification Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 775983, in accordance with application 244207, revision 3.

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

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

The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the 2005 Connecticut State Building Code (2003 International Building Code) with 2013 Amendment based upon a wind speed of 85 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the appurtenances listed in Tables 1 and 2 and the attached drawings for the determined available structural capacity to be effective.

We at *Tower Engineering Professionals* 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: Gautam Sopal, E.I. / JLK

Respectfully submitted by:

Graham M. Andres, P.E.

STATE OF CONNECTICUT
GRAHAM M. ANDRES
29538
LICENSED
PROFESSIONAL ENGINEER
4/24/15

Electronic Copy

Date: **April 24, 2015**

Andrew Bazinet
Crown Castle
3 Corporate Park Drive
Clifton Park, NY 12065
(585) 370-4766

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
(919) 661-6351
crown@tepgroup.net

Subject: **Structural Modification Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	118026
	Carrier Site Name:	Westbrook NE
Crown Castle Designation:	**Crown Castle BU Number:**	876384
	Crown Castle Site Name:	Westbrook / Orsina
	Crown Castle JDE Job Number:	290847
	Crown Castle Work Order Number:	1042367
	Crown Castle Application Number:	244207 Rev.3
Engineering Firm Designation:	**TEP Project Number:**	25589.31758
Site Data:	**798 Toby Hill Road, Westbrook, Middlesex County, CT 06498**	
	Latitude *41° 19' 12.70"*, Longitude *-72° 26' 32.20"*	
	150 Foot - Monopole Tower	

Dear Andrew Bazinet,

Tower Engineering Professionals is pleased to submit this **"Structural Modification Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 775983, in accordance with application 244207, revision 3.

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

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

The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the 2005 Connecticut State Building Code (2003 International Building Code) with 2013 Amendment based upon a wind speed of 85 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the appurtenances listed in Tables 1 and 2 and the attached drawings for the determined available structural capacity to be effective.

We at *Tower Engineering Professionals* 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: Gautam Sopal, E.I. / JLK

Respectfully submitted by:

Graham M. Andres, P.E.

STATE OF CONNECTICUT GRAHAM M. ANDRES 29538 LICENSED PROFESSIONAL ENGINEER 4/24/15

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 150-ft monopole tower designed by Engineering Endeavors, Inc. in July of 2000. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F for the appurtenances listed in Table 3. The tower has been modified per reinforcement drawings prepared by Tower Engineering Professionals in December of 2007. All information provided to TEP was assumed to be accurate and complete.

2) ANALYSIS CRITERIA

The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and ASCE 7-05 Minimum Design Loads for Buildings and Other Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch escalating 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
140.0	140.0	3	Alcatel Lucent	RRH2X60-AWS	1	1-5/8	1
		3	Alcatel Lucent	RRH2X60-PCS			
		6	Commscope	HBXX-6517DS-A2M w/ Mount Pipe			
		1	Commscope	LNX-6514DS-VTM w/ Mount Pipe			
		2	Commscope	LNX-8513DS-VTM w/ Mount Pipe			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			

Notes:
1) See "Appendix B – Base Level Drawing" for assumed feed line configuration.

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
150.0	152.0	6	Decibel	DB980H90E-M w/ Mount Pipe	6	1-5/8	1
	150.0	1	Tower Mounts	Platform Mount [LP 712-1]			
140.0	140.0	2	Antel	BXA-185063/12CF w/ Mount Pipe	-	-	2
		1	Antel	BXA-185085/12CF w/ Mount Pipe			
		3	Antel	BXA-70063/6CF w/ Mount Pipe			
		3	Decibel	DB844H65E-XY w/ Mount Pipe			
		3	Antel	BXA-70063/6CF w/ Mount Pipe	18	1-5/8	1
		1	Tower Mounts	Platform Mount [LP 304-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
130.0	130.0	1	Andrew	DBXNH-6565B-R2M w/ Mount Pipe	1 2 12	3/8 7/16 1-5/8	1
		3	Ericsson	RRUS 11			
		1	KMW Communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	Powerwave Technologies	7770.00 w/ Mount Pipe			
		6	Powerwave Technologies	LGP21401			
		6	Powerwave Technologies	LGP21901			
		1	Powerwave Technologies	P65-16-XLH-RR w/ Mount Pipe			
		1	Raycap	DC6-48-60-18-8F			
		1	Tower Mounts	Side Arm Mount [SO 701-3]			
		1	Tower Mounts	Platform Mount [LP 304-1]			
80.0	81.0	1	Lucent	KS24019-L112A	1	1/2	1
	80.0	1	Tower Mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing equipment
2) Existing 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)
150.0	150.0	12	DAPA	458000	-	-
140.0	140.0	12	DAPA	458000	-	-
130.0	130.0	12	DAPA	458000	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Reports	Dr. Clarence Welti, P.E., P.C.	1615342	CCISites
Tower Foundation Drawings	Engineering Endeavors, Inc.	1615435	CCISites
Tower Manufacturer Drawings	Engineering Endeavors, Inc.	1615370	CCISites
Tower Reinforcement Drawings	Tower Engineering Professionals, Inc.	2154747	CCISites
Previous Structural Analysis Report	Tower Engineering Professionals, Inc.	5616550	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.

For analysis of monopole shaft reinforcements, the plates are modeled as linear appurtenances along the exterior of the pole. The loads calculated from tnxTower are then exported to a proprietary calculation sheet created by Tower Engineering Professionals, Inc. that analyzes each reinforcing element along each critical axis and presents percent capacities for each element and the pole shaft along each critical axis. The actual percent capacity of the tower structure including the reinforcing elements is reported in Table 5 - Section Capacity (Summary).

3.2) Assumptions

1) The tower and foundation were built in accordance with the manufacturer's specifications.
2) The tower and foundation 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 "Appendix B – Base Level Drawing".
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by the standard.
5) All tower components are in sufficient condition to carry their full design capacity.
6) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
7) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not perform a site visit to verify the size, condition or capacity of the antenna mounts and did not analyze antennas supporting mounts as part of this structural analysis report.
8) Per recent photos, the TME's listed below are shown to be installed directly behind the existing antennas and oriented such that they are completely shielded from the front, but not the sides:
   a) (6) Powerwave Technologies LGP21401 at 130-ft mount level
   b) (6) Powerwave Technologies LGP21901 at 130-ft mount level

This analysis may be affected if any assumptions are not valid or have been made in error. Tower Engineering Professionals 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	150.00-133.71	Pole	TP16.65×13.00×0.1875	1	Note 1	Note 1	43.0	Pass
L2	136.29-88.08	Pole	TP26.38×15.70×0.3125	2	Note 1	Note 1	93.9	Pass
L3	91.92-43.50	Pole	TP35.62×24.91×0.3750	3	Note 1	Note 1	71.4	Pass
L4	48.50-0.00	Pole	TP44.50×33.76×0.3750	4	Note 1	Note 1	85.2	Pass
M1	35.00-0.00	Mod (Pr)	CCI-WSFP-060100	1	Note 1	Note 1	86.8	Pass
M2	30.00-0.00	Mod (Pr)	CCI-WSFP-060100	2	Note 1	Note 1	86.8	Pass
M3b	65.00-30.00	Mod (Pr)	CCI-SFP-060100	3	Note 1	Note 1	95.3	Pass
M4	85.00-65.00	Mod (Pr)	CCI-SFP-060100	4	Note 1	Note 1	85.6	Pass
M5	110.00-85.00	Mod (Pr)	CCI-SFP-045100	5	Note 1	Note 1	94.8	Pass
							Summary	
						Pole (L2)	93.9	Pass
						Mod (M3b)	95.3	Pass
						RATING =	**95.3**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	-	99.8	Pass
1	Base Plate	-	98.9	Pass
1	Base Foundation Soil Interaction	-	53.4	Pass
1	Base Foundation Structural	-	45.1	Pass

Structure Rating (max from all components) =	99.8%

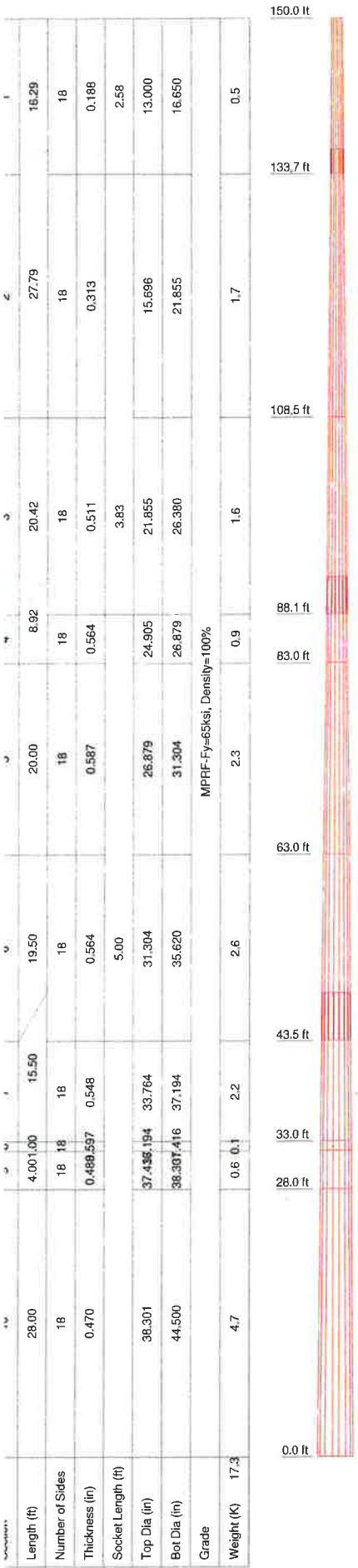
Notes:
1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.

4.1) Recommendations

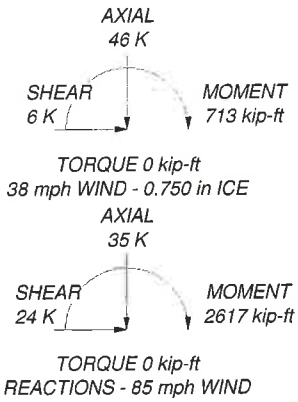
1) If the load differs from that described in Tables 1 and 2 of this report, "Appendix B – Base Level Drawing" or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
2) The modifications depicted in "Appendix D – Structural Design Drawings" shall be installed and, upon completion, inspected. The tower and its foundation have sufficient capacity to carry the existing and proposed loads once the proposed modifications are installed.

APPENDIX A

TNXTOWER OUTPUT



Section												
Length (ft)	28.00	4.00	15.50	19.50	20.00	20.42	8.92	27.79	16.29			
Number of Sides	18	18	18	18	18	18	18	18	18			
Thickness (in)	0.470	0.488	0.548	0.564	0.587	0.511	0.564	0.313	0.188			
Socket Length (ft)				5.00		3.83			2.58			
Top Dia (in)	38.301	37.436	33.764	31.304	26.879	21.855	24.905	15.696	13.000			
Bot Dia (in)	44.500	38.307	37.194	35.620	31.304	26.380	26.879	21.855	16.650			
Grade												
Weight (K)	17.3	0.6	2.2	2.6	2.3	1.6	0.9	1.7	0.5			



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB980H90E-M w/ Mount Pipe	150	(2) 7770.00 w/ Mount Pipe	130
(2) DB980H90E-M w/ Mount Pipe	150	(2) 7770.00 w/ Mount Pipe	130
(2) DB980H90E-M w/ Mount Pipe	150	(2) 7770.00 w/ Mount Pipe	130
2.4" Dia. x 6' Mount Pipe	150	(2) LGP21401	130
2.4" Dia. x 6' Mount Pipe	150	(2) LGP21401	130
2.4" Dia. x 6' Mount Pipe	150	(2) LGP21401	130
Platform Mount [LP 712-1]	150	(2) LGP21901	130
(2) HBXX-6517DS-A2M w/ Mount Pipe	140	(2) LGP21901	130
(2) HBXX-6517DS-A2M w/ Mount Pipe	140	(2) LGP21901	130
(2) HBXX-6517DS-A2M w/ Mount Pipe	140	RRUS 11	130
RRH2X60-PCS	140	RRUS 11	130
RRH2X60-PCS	140	RRUS 11	130
RRH2X60-PCS	140	DBXNH-6565B-R2M w/ Mount Pipe	130
RRH2X60-AWS	140	P65-16-XLH-RR w/ Mount Pipe	130
RRH2X60-AWS	140	AM-X-CD-16-65-00T-RET w/ Mount Pipe	130
RRH2X60-AWS	140		
DB-T1-6Z-8AB-0Z	140	DC6-48-60-18-8F	130
LNX-8513DS-VTM w/ Mount Pipe	140	Platform Mount [LP 304-1]	130
LNX-6514DS-VTM w/ Mount Pipe	140	Side Arm Mount [SO 701-3]	130
LNX-8513DS-VTM w/ Mount Pipe	140	2.4" Dia x 4-ft Mount Pipe	130
BXA-70063/6CF w/ Mount Pipe	140	2.4" Dia x 4-ft Mount Pipe	130
BXA-70063/6CF w/ Mount Pipe	140	2.4" Dia x 4-ft Mount Pipe	130
BXA-70063/6CF w/ Mount Pipe	140	KS24019-L112A	80
Platform Mount [LP 304-1]	140	Side Arm Mount [SO 701-1]	80

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
MPRF-Fy=65ks Density=100%	65 ksi	80 ksi			

TOWER DESIGN NOTES

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

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

Job: *Westbrook / Orsina (BU 876384)*			
Project: *TEP No. 25589.31758*			
Client: Crown Castle	Drawn by: GJS	App'd:	
Code: TIA/EIA-222-F	Date: 04/23/15	Scale: N	
Path:		Dwg No.	

Tower Input Data

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

Tower is located in Middlesex County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.750 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	150.00-133.71	16.29	2.58	18	13.000	16.650	0.188	0.750	MPRF-Fy=65ksi, Density=100% (65 ksi)
L2	133.71-108.50	27.79	0.00	18	15.696	21.855	0.313	1.250	MPRF-Fy=65ksi, Density=100% (65 ksi)
L3	108.50-88.08	20.42	3.83	18	21.855	26.380	0.511	2.044	MPRF-Fy=65ks

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L4	88.08-83.00	8.92	0.00	18	24.905	26.879	0.564	2.257	i, Density=100% (65 ksi) MPRF-Fy=65ksi, Density=100% (65 ksi)
L5	83.00-63.00	20.00	0.00	18	26.879	31.304	0.587	2.349	MPRF-Fy=65ksi, Density=100% (65 ksi)
L6	63.00-43.50	19.50	5.00	18	31.304	35.620	0.564	2.256	MPRF-Fy=65ksi, Density=100% (65 ksi)
L7	43.50-33.00	15.50	0.00	18	33.764	37.194	0.548	2.192	MPRF-Fy=65ksi, Density=100% (65 ksi)
L8	33.00-32.00	1.00	0.00	18	37.194	37.416	0.597	2.387	MPRF-Fy=65ksi, Density=100% (65 ksi)
L9	32.00-28.00	4.00	0.00	18	37.416	38.301	0.488	1.951	MPRF-Fy=65ksi, Density=100% (65 ksi)
L10	28.00-0.00	28.00		18	38.301	44.500	0.470	1.879	MPRF-Fy=65ksi, Density=100% (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	13.201	7.625	158.142	4.548	6.604	23.946	316.492	3.813	1.958	10.443
	16.907	9.797	335.454	5.844	8.458	39.660	671.349	4.900	2.600	13.869
L2	16.520	15.259	456.220	5.461	7.974	57.216	913.040	7.631	2.213	7.08
	22.193	21.368	1252.882	7.648	11.103	112.846	2507.413	10.686	3.297	10.549
L3	22.193	34.621	1992.710	7.577	11.103	179.482	3988.043	17.314	2.947	5.767
	26.787	41.960	3547.547	9.183	13.401	264.722	7099.762	20.984	3.743	7.325
L4	26.151	43.596	3263.404	8.641	12.652	257.936	6531.101	21.802	3.390	6.008
	27.293	47.130	4123.067	9.342	13.654	301.960	8251.559	23.570	3.737	6.623
L5	27.293	49.005	4279.607	9.333	13.654	313.425	8564.844	24.507	3.697	6.296
	31.787	57.254	6824.985	10.905	15.903	429.175	13658.950	28.632	4.476	7.622
L6	31.787	55.021	6568.755	10.913	15.903	413.063	13146.154	27.516	4.517	8.01
	36.169	62.746	9741.987	12.445	18.095	538.381	19496.792	31.379	5.277	9.357
L7	35.408	57.780	8053.779	11.792	17.152	469.556	16118.155	28.896	4.978	9.082
	37.768	63.748	10815.954	13.009	18.895	572.433	21646.139	31.880	5.582	10.184
L8	37.768	69.325	11730.952	12.992	18.895	620.859	23477.340	34.669	5.496	9.209
	37.993	69.745	11945.131	13.071	19.007	628.454	23905.979	34.879	5.535	9.274
L9	37.993	57.168	9849.124	13.109	19.007	518.179	19711.207	28.589	5.727	11.741
	38.892	58.538	10574.802	13.424	19.457	543.495	21163.519	29.275	5.883	12.061
L10	38.892	56.405	10199.132	13.430	19.457	524.188	20411.684	28.208	5.914	12.59
	45.186	65.647	16078.908	15.631	22.606	711.267	32178.974	32.830	7.005	14.913

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft^2	in					in	in
L1 150.00-133.71				1	1	1		
L2 133.71-108.50				1	1	1		
L3 108.50-88.08				1	1	0.616363		
L4 88.08-83.00				1	1	0.669336		
L5 83.00-63.00				1	1	0.642985		
L6 63.00-43.50				1	1	0.668695		
L7 43.50-33.00				1	1	0.687457		
L8 33.00-32.00				1	1	0.632128		
L9 32.00-28.00				1	1	0.771147		
L10 28.00-0.00				1	1	0.80003		

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
Safety Line 3/8	A	No	CaAa (Out Of Face)	150.00 - 0.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46
Step Pegs (5/8" SR) 7-in. w/30" step	A	No	CaAa (Out Of Face)	150.00 - 0.00	1	No Ice	0.03	0.49
						1/2" Ice	0.14	1.01
						1" Ice	0.23	2.07
						2" Ice	0.43	6.09
						4" Ice	0.83	21.46
A Face								
LDF7-50A(1-5/8")	A	No	Inside Pole	150.00 - 0.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
B Face								
LDF4-50A(1/2")	B	No	Inside Pole	80.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
LDF7-50A(1-5/8")	B	No	Inside Pole	130.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
WR-VG122ST-BRDA(7/16)	B	No	CaAa (Out Of Face)	130.00 - 110.00	1	No Ice	0.05	0.14
						1/2" Ice	0.15	0.73
						1" Ice	0.25	1.92
						2" Ice	0.45	6.15
						4" Ice	0.85	21.94
WR-VG122ST-BRDA(7/16)	B	No	CaAa (Out Of Face)	130.00 - 110.00	1	No Ice	0.00	0.14
						1/2" Ice	0.00	0.73
						1" Ice	0.00	1.92

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						2" Ice	0.00	6.15
						4" Ice	0.00	21.94
WR-VG122ST-BRDA(7/16)	B	No	CaAa (Out Of Face)	110.00 - 0.00	2	No Ice	0.00	0.14
						1/2" Ice	0.00	0.73
						1" Ice	0.00	1.92
						2" Ice	0.00	6.15
						4" Ice	0.00	21.94
WR-VG122ST-BRDA(3/8)	B	No	CaAa (Out Of Face)	130.00 - 0.00	1	No Ice	0.00	0.20
						1/2" Ice	0.00	0.74
						1" Ice	0.00	1.89
						2" Ice	0.00	6.03
						4" Ice	0.00	21.63
C Face								
LCF158-50JA-A7(1 5/8")	C	No	Inside Pole	140.00 - 0.00	12	No Ice	0.00	0.80
						1/2" Ice	0.00	0.80
						1" Ice	0.00	0.80
						2" Ice	0.00	0.80
						4" Ice	0.00	0.80
LCF158-50JA-A7(1 5/8")	C	No	CaAa (Out Of Face)	140.00 - 0.00	6	No Ice	0.00	0.80
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
LCF158-50JA-A7(1 5/8")	C	No	CaAa (Out Of Face)	140.00 - 0.00	1	No Ice	0.20	0.80
						1/2" Ice	0.30	2.31
						1" Ice	0.40	4.44
						2" Ice	0.60	10.52
						4" Ice	1.00	30.02
Proposed Mods								
CCI-65FP-060100	A	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.17	20.42
						1/2" Ice	0.28	21.37
						1" Ice	0.39	22.66
						2" Ice	0.61	26.29
						4" Ice	1.06	37.70
CCI-65FP-060100	B	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	C	No	CaAa (Out Of Face)	30.00 - 0.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	A	No	CaAa (Out Of Face)	30.00 - 0.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
***								
CCI-65FP-060100	A	No	CaAa (Out Of Face)	65.00 - 35.00	1	No Ice	0.17	20.42
						1/2" Ice	0.28	21.37
						1" Ice	0.39	22.66
						2" Ice	0.61	26.29
						4" Ice	1.06	37.70
CCI-65FP-060100	A	No	CaAa (Out Of Face)	35.00 - 30.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	B	No	CaAa (Out Of	65.00 - 30.00	1	No Ice	0.00	20.42

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
			Face)			1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	C	No	CaAa (Out Of Face)	65.00 - 30.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
***								
CCI-65FP-060100	A	No	CaAa (Out Of Face)	85.00 - 65.00	1	No Ice	0.17	20.42
						1/2" Ice	0.28	21.37
						1" Ice	0.39	22.66
						2" Ice	0.61	26.29
						4" Ice	1.06	37.70
CCI-65FP-060100	B	No	CaAa (Out Of Face)	85.00 - 65.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	C	No	CaAa (Out Of Face)	85.00 - 65.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
***								
CCI-65FP-045100	A	No	CaAa (Out Of Face)	110.00 - 85.00	1	No Ice	0.17	15.31
						1/2" Ice	0.28	16.17
						1" Ice	0.39	17.36
						2" Ice	0.61	20.80
						4" Ice	1.06	31.82
CCI-65FP-045100	A	No	CaAa (Out Of Face)	110.00 - 85.00	1	No Ice	0.00	15.31
						1/2" Ice	0.00	16.17
						1" Ice	0.00	17.36
						2" Ice	0.00	20.80
						4" Ice	0.00	31.82
CCI-65FP-045100	A	No	CaAa (Out Of Face)	110.00 - 85.00	1	No Ice	0.00	15.31
						1/2" Ice	0.00	16.17
						1" Ice	0.00	17.36
						2" Ice	0.00	20.80
						4" Ice	0.00	31.82

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	150.00-133.71	A	0.000	0.000	0.000	1.181	0.09
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.245	0.10
L2	133.71-108.50	A	0.000	0.000	0.000	2.078	0.21
		B	0.000	0.000	0.000	0.920	0.22
		C	0.000	0.000	0.000	4.992	0.38
L3	108.50-88.08	A	0.000	0.000	0.000	4.883	1.05
		B	0.000	0.000	0.000	0.000	0.21
		C	0.000	0.000	0.000	4.043	0.31
L4	88.08-83.00	A	0.000	0.000	0.000	1.216	0.21
		B	0.000	0.000	0.000	0.000	0.09

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	1.006	0.12
L5	83.00-63.00	A	0.000	0.000	0.000	4.783	0.52
		B	0.000	0.000	0.000	0.000	0.62
		C	0.000	0.000	0.000	3.960	0.71
L6	63.00-43.50	A	0.000	0.000	0.000	4.665	0.51
		B	0.000	0.000	0.000	0.000	0.60
		C	0.000	0.000	0.000	3.862	0.69
L7	43.50-33.00	A	0.000	0.000	0.000	2.510	0.31
		B	0.000	0.000	0.000	0.000	0.37
		C	0.000	0.000	0.000	2.078	0.37
L8	33.00-32.00	A	0.000	0.000	0.000	0.239	0.05
		B	0.000	0.000	0.000	0.000	0.05
		C	0.000	0.000	0.000	0.198	0.04
L9	32.00-28.00	A	0.000	0.000	0.000	0.957	0.19
		B	0.000	0.000	0.000	0.000	0.16
		C	0.000	0.000	0.000	0.792	0.14
L10	28.00-0.00	A	0.000	0.000	0.000	6.697	1.30
		B	0.000	0.000	0.000	0.000	0.86
		C	0.000	0.000	0.000	5.544	1.00

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	150.00-133.71	A	0.893	0.000	0.000	0.000	7.001	0.13
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.369	0.09
L2	133.71-108.50	A	0.876	0.000	0.000	0.000	11.382	0.28
		B		0.000	0.000	0.000	4.493	0.32
		C		0.000	0.000	0.000	9.495	0.34
L3	108.50-88.08	A	0.855	0.000	0.000	0.000	15.740	1.20
		B		0.000	0.000	0.000	0.000	0.30
		C		0.000	0.000	0.000	7.532	0.27
L4	88.08-83.00	A	0.841	0.000	0.000	0.000	3.919	0.24
		B		0.000	0.000	0.000	0.000	0.12
		C		0.000	0.000	0.000	1.875	0.11
L5	83.00-63.00	A	0.825	0.000	0.000	0.000	15.045	0.60
		B		0.000	0.000	0.000	0.000	0.73
		C		0.000	0.000	0.000	7.259	0.71
L6	63.00-43.50	A	0.794	0.000	0.000	0.000	14.299	0.58
		B		0.000	0.000	0.000	0.000	0.71
		C		0.000	0.000	0.000	6.959	0.69
L7	43.50-33.00	A	0.763	0.000	0.000	0.000	7.696	0.36
		B		0.000	0.000	0.000	0.000	0.43
		C		0.000	0.000	0.000	3.745	0.37
L8	33.00-32.00	A	0.750	0.000	0.000	0.000	0.706	0.05
		B		0.000	0.000	0.000	0.000	0.06
		C		0.000	0.000	0.000	0.348	0.03
L9	32.00-28.00	A	0.750	0.000	0.000	0.000	2.823	0.21
		B		0.000	0.000	0.000	0.000	0.19
		C		0.000	0.000	0.000	1.392	0.14
L10	28.00-0.00	A	0.750	0.000	0.000	0.000	19.763	1.44
		B		0.000	0.000	0.000	0.000	1.01
		C		0.000	0.000	0.000	9.744	0.98

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	150.00-133.71	-0.095	-0.042	-0.128	-0.332
L2	133.71-108.50	-0.174	0.042	-0.148	-0.153
L3	108.50-88.08	-0.211	-0.173	-0.293	-0.537
L4	88.08-83.00	-0.214	-0.175	-0.302	-0.555
L5	83.00-63.00	-0.218	-0.178	-0.311	-0.565
L6	63.00-43.50	-0.222	-0.182	-0.322	-0.579
L7	43.50-33.00	-0.225	-0.184	-0.329	-0.591
L8	33.00-32.00	-0.225	-0.184	-0.328	-0.578
L9	32.00-28.00	-0.226	-0.185	-0.329	-0.581
L10	28.00-0.00	-0.228	-0.187	-0.337	-0.595

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
150									
(2) DB980H90E-M w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 2.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.07 0.11 0.22 0.55
(2) DB980H90E-M w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 2.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.07 0.11 0.22 0.55
(2) DB980H90E-M w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 2.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.07 0.11 0.22 0.55
2.4" Dia. x 6' Mount Pipe	A	From Centroid-Face	4.00 2.00 0.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.93 2.32 3.15 5.06	1.43 1.93 2.32 3.15 5.06	0.02 0.04 0.06 0.10 0.25
2.4" Dia. x 6' Mount Pipe	B	From Centroid-Face	4.00 2.00 0.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.93 2.32 3.15 5.06	1.43 1.93 2.32 3.15 5.06	0.02 0.04 0.06 0.10 0.25
2.4" Dia. x 6' Mount Pipe	C	From Centroid-Face	4.00 2.00 0.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.93 2.32 3.15 5.06	1.43 1.93 2.32 3.15 5.06	0.02 0.04 0.06 0.10 0.25
Platform Mount [LP 712-1]	C	None		0.000	150.00	No Ice	24.53	24.53	1.34

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1/2" Ice	29.94	29.94	1.65
						1" Ice	35.35	35.35	1.96
						2" Ice	46.17	46.17	2.58
						4" Ice	67.81	67.81	3.82
148 *140*									
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Centroid-Leg	4.00 4.50 0.00	10.000	140.00	No Ice	8.98	6.96	0.07
						1/2" Ice	9.65	8.18	0.14
						1" Ice	10.29	9.14	0.21
						2" Ice	11.59	11.02	0.40
						4" Ice	14.32	15.03	0.91
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Centroid-Leg	4.00 4.50 0.00	0.000	140.00	No Ice	8.98	6.96	0.07
						1/2" Ice	9.65	8.18	0.14
						1" Ice	10.29	9.14	0.21
						2" Ice	11.59	11.02	0.40
						4" Ice	14.32	15.03	0.91
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Centroid-Leg	4.00 4.50 0.00	30.000	140.00	No Ice	8.98	6.96	0.07
						1/2" Ice	9.65	8.18	0.14
						1" Ice	10.29	9.14	0.21
						2" Ice	11.59	11.02	0.40
						4" Ice	14.32	15.03	0.91
RRH2X60-PCS	A	From Centroid-Leg	4.00 3.00 0.00	10.000	140.00	No Ice	2.57	2.01	0.06
						1/2" Ice	2.79	2.22	0.08
						1" Ice	3.02	2.43	0.10
						2" Ice	3.52	2.89	0.16
						4" Ice	4.61	3.92	0.31
RRH2X60-PCS	B	From Centroid-Leg	4.00 3.00 0.00	0.000	140.00	No Ice	2.57	2.01	0.06
						1/2" Ice	2.79	2.22	0.08
						1" Ice	3.02	2.43	0.10
						2" Ice	3.52	2.89	0.16
						4" Ice	4.61	3.92	0.31
RRH2X60-PCS	C	From Centroid-Leg	4.00 3.00 0.00	30.000	140.00	No Ice	2.57	2.01	0.06
						1/2" Ice	2.79	2.22	0.08
						1" Ice	3.02	2.43	0.10
						2" Ice	3.52	2.89	0.16
						4" Ice	4.61	3.92	0.31
RRH2X60-AWS	A	From Centroid-Leg	4.00 6.00 0.00	10.000	140.00	No Ice	3.96	1.82	0.06
						1/2" Ice	4.27	2.08	0.08
						1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
RRH2X60-AWS	B	From Centroid-Leg	4.00 6.00 0.00	0.000	140.00	No Ice	3.96	1.82	0.06
						1/2" Ice	4.27	2.08	0.08
						1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
RRH2X60-AWS	C	From Centroid-Leg	4.00 6.00 0.00	30.000	140.00	No Ice	3.96	1.82	0.06
						1/2" Ice	4.27	2.08	0.08
						1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
DB-T1-6Z-8AB-0Z	A	From Centroid-Leg	4.00 6.00 0.00	10.000	140.00	No Ice	5.60	2.33	0.04
						1/2" Ice	5.92	2.56	0.08
						1" Ice	6.24	2.79	0.12
						2" Ice	6.91	3.28	0.21
						4" Ice	8.37	4.37	0.45
LNX-8513DS-VTM w/	A	From	4.00	10.000	140.00	No Ice	8.65	7.08	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe		Centroid-Leg	-3.00 0.00			1/2" Ice 1" Ice 2" Ice 4" Ice	9.31 9.93 11.20 13.87	8.27 9.18 11.02 15.06	0.13 0.21 0.39 0.90
LNX-6514DS-VTM w/ Mount Pipe	B	From Centroid-Leg	4.00 -3.00 0.00	0.000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.65 9.31 9.93 11.20 13.87	7.08 8.27 9.18 11.02 15.06	0.06 0.13 0.21 0.39 0.90
LNX-8513DS-VTM w/ Mount Pipe	C	From Centroid-Leg	4.00 -3.00 0.00	30.000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.65 9.31 9.93 11.20 13.87	7.08 8.27 9.18 11.02 15.06	0.06 0.13 0.21 0.39 0.90
BXA-70063/6CF w/ Mount Pipe	A	From Centroid-Leg	4.00 -6.00 0.00	10.000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.75 8.29 8.85 9.97 12.34	5.18 6.11 6.92 8.59 12.13	0.04 0.10 0.16 0.31 0.75
BXA-70063/6CF w/ Mount Pipe	B	From Centroid-Leg	4.00 -6.00 0.00	0.000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.75 8.29 8.85 9.97 12.34	5.18 6.11 6.92 8.59 12.13	0.04 0.10 0.16 0.31 0.75
BXA-70063/6CF w/ Mount Pipe	C	From Centroid-Leg	4.00 -6.00 0.00	30.000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.75 8.29 8.85 9.97 12.34	5.18 6.11 6.92 8.59 12.13	0.04 0.10 0.16 0.31 0.75
Platform Mount [LP 304-1]	C	None		0.000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	17.46 22.44 27.42 37.38 57.30	17.46 22.44 27.42 37.38 57.30	1.35 1.62 1.90 2.45 3.55
130 (2) 7770.00 w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	-20.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP21401	A	From Centroid-Face	4.00 -5.00 0.00	-20.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Centroid-Fa	4.00 -5.00	-10.000	130.00	No Ice 1/2" Ice	0.00 0.00	0.23 0.31	0.01 0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		ce	0.00			1" Ice	0.00	0.40	0.03
						2" Ice	0.00	0.61	0.05
						4" Ice	0.00	1.12	0.14
(2) LGP21401	C	From Centroid-Face	4.00 -5.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21901	A	From Centroid-Face	4.00 5.00 0.00	-20.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
(2) LGP21901	B	From Centroid-Face	4.00 5.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
(2) LGP21901	C	From Centroid-Face	4.00 5.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
RRUS 11	A	From Centroid-Face	4.00 0.00 0.00	70.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
RRUS 11	B	From Centroid-Face	4.00 0.00 0.00	80.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
RRUS 11	C	From Centroid-Face	4.00 0.00 0.00	80.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
DBXNH-6565B-R2M w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	-20.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.73 9.39 10.02 11.30 13.99	7.16 8.36 9.29 11.14 15.20	0.08 0.15 0.23 0.41 0.92
P65-16-XLH-RR w/ Mount Pipe	B	From Centroid-Face	4.00 -3.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.64 9.29 9.91 11.18 13.83	6.36 7.54 8.43 10.24 14.10	0.08 0.14 0.22 0.39 0.89
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.30 7.48 8.37 10.18 14.02	0.07 0.14 0.21 0.38 0.87
DC6-48-60-18-8F	C	From Centroid-Face	4.00 0.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.27 1.46 1.66 2.09	1.27 1.46 1.66 2.09	0.02 0.04 0.05 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	3.10	3.10	0.21
Platform Mount [LP 304-1]	C	None		0.000	130.00	No Ice	17.46	17.46	1.35
						1/2" Ice	22.44	22.44	1.62
						1" Ice	27.42	27.42	1.90
						2" Ice	37.38	37.38	2.45
						4" Ice	57.30	57.30	3.55
Side Arm Mount [SO 701-3]	C	None		0.000	130.00	No Ice	2.83	2.83	0.20
						1/2" Ice	3.92	3.92	0.24
						1" Ice	5.01	5.01	0.28
						2" Ice	7.19	7.19	0.36
						4" Ice	11.55	11.55	0.53
2.4" Dia x 4-ft Mount Pipe	A	From Centroid-Face	3.00 0.00 0.00	0.000	130.00	No Ice	0.87	0.87	0.01
						1/2" Ice	1.12	1.12	0.02
						1" Ice	1.37	1.37	0.03
						2" Ice	1.91	1.91	0.06
						4" Ice	3.24	3.24	0.16
2.4" Dia x 4-ft Mount Pipe	B	From Centroid-Face	3.00 0.00 0.00	0.000	130.00	No Ice	0.87	0.87	0.01
						1/2" Ice	1.12	1.12	0.02
						1" Ice	1.37	1.37	0.03
						2" Ice	1.91	1.91	0.06
						4" Ice	3.24	3.24	0.16
2.4" Dia x 4-ft Mount Pipe	C	From Centroid-Face	3.00 0.00 0.00	0.000	130.00	No Ice	0.87	0.87	0.01
						1/2" Ice	1.12	1.12	0.02
						1" Ice	1.37	1.37	0.03
						2" Ice	1.91	1.91	0.06
						4" Ice	3.24	3.24	0.16
* *80* KS24019-L112A	C	From Leg	3.00 0.00 1.00	0.000	80.00	No Ice	0.09	0.09	0.01
						1/2" Ice	0.15	0.15	0.01
						1" Ice	0.22	0.22	0.01
						2" Ice	0.40	0.40	0.02
						4" Ice	0.89	0.89	0.04
Side Arm Mount [SO 701-1]	C	From Leg	1.50 0.00 0.00	30.000	80.00	No Ice	0.85	1.67	0.07
						1/2" Ice	1.14	2.34	0.08
						1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
						4" Ice	3.17	7.03	0.18

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

Comb. No.	Description
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	150 - 133.71	Pole	Max Tension	30	0.00	0.00	0.00
			Max. Compression	14	-8.22	-0.66	0.48
			Max. Mx	5	-3.28	-67.59	-0.16
			Max. My	2	-3.31	0.38	66.98
			Max. Vy	11	-9.76	67.15	0.69
			Max. Vx	2	-9.61	0.38	66.98
			Max. Torque	9			1.55
L2	133.71 - 108.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.86	-0.35	0.99
			Max. Mx	5	-8.14	-454.22	-2.57
			Max. My	2	-8.17	2.96	449.92
			Max. Vy	11	-15.77	454.21	3.29
			Max. Vx	2	-15.62	2.96	449.92
			Max. Torque	9			1.55
L3	108.5 - 88.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.04	-0.37	1.86
			Max. Mx	11	-10.93	725.95	5.42
			Max. My	2	-10.95	4.42	719.86
			Max. Vy	11	-17.03	725.95	5.42
			Max. Vx	2	-16.88	4.42	719.86
			Max. Torque	2			-0.55
L4	88.0833 - 83	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-21.45	-0.38	2.23
			Max. Mx	11	-12.97	881.29	6.49
			Max. My	2	-12.99	5.21	874.14
			Max. Vy	11	-17.78	881.29	6.49
			Max. Vx	2	-17.63	5.21	874.14
			Max. Torque	13			-0.53
L5	83 - 63	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.53	-0.17	2.08
			Max. Mx	11	-17.47	1253.01	8.03
			Max. My	2	-17.48	7.15	1243.03
			Max. Vy	11	-19.37	1253.01	8.03
			Max. Vx	2	-19.25	7.15	1243.03
			Max. Torque	13			-0.53
L6	63 - 43.4967	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30.39	-0.18	2.05
			Max. Mx	11	-20.92	1541.46	9.21
			Max. My	2	-20.93	8.45	1529.67
			Max. Vy	11	-20.42	1541.46	9.21
			Max. Vx	2	-20.31	8.45	1529.67
			Max. Torque	13			-0.33
L7	43.4967 - 33	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-35.66	-0.26	2.06
			Max. Mx	11	-25.54	1867.14	10.48
			Max. My	2	-25.55	9.79	1853.51
			Max. Vy	11	-21.55	1867.14	10.48
			Max. Vx	2	-21.43	9.79	1853.51
			Max. Torque	13			-0.32
L8	33 - 32	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-35.99	-0.29	2.07
			Max. Mx	11	-25.84	1888.69	10.57
			Max. My	2	-25.84	9.85	1874.98
			Max. Vy	11	-21.61	1888.69	10.57
			Max. Vx	2	-21.50	9.85	1874.98
			Max. Torque	13			-0.31
L9	32 - 28	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-37.28	-0.35	2.17
			Max. Mx	11	-27.01	1975.55	10.99
			Max. My	2	-27.01	10.15	1961.49
			Max. Vy	11	-21.85	1975.55	10.99
			Max. Vx	2	-21.74	10.15	1961.49
			Max. Torque	13			-0.31
L10	28 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-46.45	-0.37	3.18
			Max. Mx	11	-35.35	2610.51	14.12
			Max. My	2	-35.35	12.62	2594.00
			Max. Vy	11	-23.53	2610.51	14.12
			Max. Vx	2	-23.42	12.62	2594.00
			Max. Torque	13			-0.30

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	15	46.45	0.01	6.19
	Max. H_x	11	35.36	23.51	0.08
	Max. H_z	2	35.36	0.08	23.41

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. M_x	2	2594.00	0.08	23.41
	Max. M_z	5	2609.09	-23.51	-0.08
	Max. Torsion	6	0.28	-20.40	-11.77
	Min. Vert	1	35.36	0.00	0.00
	Min. H_x	5	35.36	-23.51	-0.08
	Min. H_z	8	35.36	-0.08	-23.41
	Min. M_x	8	-2589.59	-0.08	-23.41
	Min. M_z	11	-2610.51	23.51	0.08
	Min. Torsion	13	-0.28	11.83	20.31

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	35.36	0.00	0.00	-2.16	0.69	-0.00
Dead+Wind 0 deg - No Ice	35.36	-0.08	-23.41	-2594.00	12.62	0.21
Dead+Wind 30 deg - No Ice	35.36	11.69	-20.23	-2240.85	-1293.94	0.08
Dead+Wind 60 deg - No Ice	35.36	20.32	-11.63	-1287.80	-2253.57	-0.08
Dead+Wind 90 deg - No Ice	35.36	23.51	0.08	9.69	-2609.09	-0.21
Dead+Wind 120 deg - No Ice	35.36	20.40	11.77	1303.92	-2265.37	-0.28
Dead+Wind 150 deg - No Ice	35.36	11.83	20.31	2248.23	-1314.51	-0.28
Dead+Wind 180 deg - No Ice	35.36	0.08	23.41	2589.59	-11.19	-0.21
Dead+Wind 210 deg - No Ice	35.36	-11.69	20.23	2236.42	1295.39	-0.08
Dead+Wind 240 deg - No Ice	35.36	-20.32	11.63	1283.36	2255.00	0.07
Dead+Wind 270 deg - No Ice	35.36	-23.51	-0.08	-14.12	2610.51	0.20
Dead+Wind 300 deg - No Ice	35.36	-20.40	-11.77	-1308.34	2266.78	0.28
Dead+Wind 330 deg - No Ice	35.36	-11.83	-20.31	-2252.64	1315.93	0.28
Dead+Ice+Temp	46.45	0.00	-0.00	-3.18	-0.37	-0.00
Dead+Wind 0 deg+Ice+Temp	46.45	-0.01	-6.19	-711.84	1.35	0.01
Dead+Wind 30 deg+Ice+Temp	46.45	3.08	-5.35	-616.04	-353.30	-0.09
Dead+Wind 60 deg+Ice+Temp	46.45	5.35	-3.08	-356.06	-613.39	-0.16
Dead+Wind 90 deg+Ice+Temp	46.45	6.18	0.01	-1.55	-709.23	-0.19
Dead+Wind 120 deg+Ice+Temp	46.45	5.36	3.10	352.50	-615.13	-0.17
Dead+Wind 150 deg+Ice+Temp	46.45	3.10	5.36	611.21	-356.31	-0.10
Dead+Wind 180 deg+Ice+Temp	46.45	0.01	6.19	705.27	-2.12	-0.01
Dead+Wind 210 deg+Ice+Temp	46.45	-3.08	5.35	609.47	352.53	0.09
Dead+Wind 240 deg+Ice+Temp	46.45	-5.35	3.08	349.49	612.62	0.16
Dead+Wind 270 deg+Ice+Temp	46.45	-6.18	-0.01	-5.02	708.45	0.19
Dead+Wind 300 deg+Ice+Temp	46.45	-5.36	-3.10	-359.06	614.36	0.17
Dead+Wind 330 deg+Ice+Temp	46.45	-3.10	-5.36	-617.78	355.54	0.10
Dead+Wind 0 deg - Service	35.36	-0.03	-8.10	-901.01	4.84	0.08
Dead+Wind 30 deg - Service	35.36	4.04	-7.00	-778.54	-448.25	0.03
Dead+Wind 60 deg - Service	35.36	7.03	-4.03	-448.05	-781.05	-0.02
Dead+Wind 90 deg - Service	35.36	8.14	0.03	1.90	-904.36	-0.07
Dead+Wind 120 deg - Service	35.36	7.06	4.07	450.75	-785.18	-0.10
Dead+Wind 150 deg - Service	35.36	4.09	7.03	778.22	-455.41	-0.10
Dead+Wind 180 deg - Service	35.36	0.03	8.10	896.56	-3.42	-0.08
Dead+Wind 210 deg - Service	35.36	-4.04	7.00	774.09	449.68	-0.03
Dead+Wind 240 deg - Service	35.36	-7.03	4.03	443.59	782.47	0.02
Dead+Wind 270 deg - Service	35.36	-8.14	-0.03	-6.36	905.78	0.07
Dead+Wind 300 deg - Service	35.36	-7.06	-4.07	-455.20	786.59	0.10
Dead+Wind 330 deg - Service	35.36	-4.09	-7.03	-782.67	456.83	0.10

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-35.36	0.00	0.00	35.36	0.00	0.000%
2	-0.08	-35.36	-23.41	0.08	35.36	23.41	0.000%
3	11.69	-35.36	-20.23	-11.69	35.36	20.23	0.000%
4	20.32	-35.36	-11.63	-20.32	35.36	11.63	0.000%
5	23.51	-35.36	0.08	-23.51	35.36	-0.08	0.000%
6	20.40	-35.36	11.77	-20.40	35.36	-11.77	0.000%
7	11.83	-35.36	20.31	-11.83	35.36	-20.31	0.000%
8	0.08	-35.36	23.41	-0.08	35.36	-23.41	0.000%
9	-11.69	-35.36	20.23	11.69	35.36	-20.23	0.000%
10	-20.32	-35.36	11.63	20.32	35.36	-11.63	0.000%
11	-23.51	-35.36	-0.08	23.51	35.36	0.08	0.000%
12	-20.40	-35.36	-11.77	20.40	35.36	11.77	0.000%
13	-11.83	-35.36	-20.31	11.83	35.36	20.31	0.000%
14	0.00	-46.45	0.00	-0.00	46.45	0.00	0.000%
15	-0.01	-46.45	-6.19	0.01	46.45	6.19	0.000%
16	3.08	-46.45	-5.35	-3.08	46.45	5.35	0.000%
17	5.35	-46.45	-3.08	-5.35	46.45	3.08	0.000%
18	6.18	-46.45	0.01	-6.18	46.45	-0.01	0.000%
19	5.36	-46.45	3.10	-5.36	46.45	-3.10	0.000%
20	3.10	-46.45	5.36	-3.10	46.45	-5.36	0.000%
21	0.01	-46.45	6.19	-0.01	46.45	-6.19	0.000%
22	-3.08	-46.45	5.35	3.08	46.45	-5.35	0.000%
23	-5.35	-46.45	3.08	5.35	46.45	-3.08	0.000%
24	-6.18	-46.45	-0.01	6.18	46.45	0.01	0.000%
25	-5.36	-46.45	-3.10	5.36	46.45	3.10	0.000%
26	-3.10	-46.45	-5.36	3.10	46.45	5.36	0.000%
27	-0.03	-35.36	-8.10	0.03	35.36	8.10	0.000%
28	4.04	-35.36	-7.00	-4.04	35.36	7.00	0.000%
29	7.03	-35.36	-4.03	-7.03	35.36	4.03	0.000%
30	8.14	-35.36	0.03	-8.14	35.36	-0.03	0.000%
31	7.06	-35.36	4.07	-7.06	35.36	-4.07	0.000%
32	4.09	-35.36	7.03	-4.09	35.36	-7.03	0.000%
33	0.03	-35.36	8.10	-0.03	35.36	-8.10	0.000%
34	-4.04	-35.36	7.00	4.04	35.36	-7.00	0.000%
35	-7.03	-35.36	4.03	7.03	35.36	-4.03	0.000%
36	-8.14	-35.36	-0.03	8.14	35.36	0.03	0.000%
37	-7.06	-35.36	-4.07	7.06	35.36	4.07	0.000%
38	-4.09	-35.36	-7.03	4.09	35.36	7.03	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00003916
3	Yes	6	0.00000001	0.00020891
4	Yes	6	0.00000001	0.00020753
5	Yes	5	0.00000001	0.00004101
6	Yes	6	0.00000001	0.00020875
7	Yes	6	0.00000001	0.00021171
8	Yes	5	0.00000001	0.00011550
9	Yes	6	0.00000001	0.00020639
10	Yes	6	0.00000001	0.00020811

11	Yes	5	0.00000001	0.00009132
12	Yes	6	0.00000001	0.00021208
13	Yes	6	0.00000001	0.00020878
14	Yes	4	0.00000001	0.00006212
15	Yes	6	0.00000001	0.00010411
16	Yes	6	0.00000001	0.00014062
17	Yes	6	0.00000001	0.00014105
18	Yes	6	0.00000001	0.00010376
19	Yes	6	0.00000001	0.00013960
20	Yes	6	0.00000001	0.00014042
21	Yes	6	0.00000001	0.00010286
22	Yes	6	0.00000001	0.00013854
23	Yes	6	0.00000001	0.00013824
24	Yes	6	0.00000001	0.00010355
25	Yes	6	0.00000001	0.00014216
26	Yes	6	0.00000001	0.00014119
27	Yes	4	0.00000001	0.00035094
28	Yes	5	0.00000001	0.00036635
29	Yes	5	0.00000001	0.00036300
30	Yes	4	0.00000001	0.00031728
31	Yes	5	0.00000001	0.00036639
32	Yes	5	0.00000001	0.00037546
33	Yes	4	0.00000001	0.00042028
34	Yes	5	0.00000001	0.00035574
35	Yes	5	0.00000001	0.00036180
36	Yes	4	0.00000001	0.00036307
37	Yes	5	0.00000001	0.00038113
38	Yes	5	0.00000001	0.00036921

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	150 - 148.946	TP16.65x13x0.188	16.29	0.00	0.0	39.000	7.766	-1.23	302.86	0.004
	148.946 - 147.891					39.000	7.906	-1.26	308.34	0.004
	147.891 - 146.837					39.000	8.047	-1.30	313.83	0.004
	146.837 - 145.783					39.000	8.187	-1.33	319.31	0.004
	145.783 - 144.728					39.000	8.328	-1.37	324.79	0.004
	144.728 - 143.674					39.000	8.469	-1.40	330.28	0.004
	143.674 - 142.619					39.000	8.609	-1.44	335.76	0.004
	142.619 - 141.565					39.000	8.750	-1.48	341.24	0.004
	141.565 - 140.511					39.000	8.890	-1.52	346.73	0.004
	140.511 - 139.456					39.000	9.031	-3.17	352.21	0.009
	139.456 - 138.402					39.000	9.172	-3.19	357.69	0.009

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 $\frac{P}{P_a}$
	138.402 - 137.348					39.000	9.312	-3.22	363.18	0.009
	137.348 - 136.293					39.000	9.453	-3.27	368.66	0.009
	136.293 - 133.71					39.000	9.797	-1.35	382.09	0.004
L2	136.293 - 133.71	TP21.855x15.696x0.313	27.79	0.00	0.0	39.000	15.826	-2.17	617.23	0.004
	133.71 - 132.383					39.000	16.118	-3.63	628.61	0.006
	132.383 - 131.056					39.000	16.410	-3.75	639.98	0.006
	131.056 - 129.729					39.000	16.701	-5.74	651.36	0.009
	129.729 - 128.403					39.000	16.993	-5.87	662.73	0.009
	128.403 - 127.076					39.000	17.285	-6.00	674.11	0.009
	127.076 - 125.749					39.000	17.576	-6.14	685.48	0.009
	125.749 - 124.422					39.000	17.868	-6.28	696.86	0.009
	124.422 - 123.095					39.000	18.160	-6.42	708.23	0.009
	123.095 - 121.768					39.000	18.451	-6.56	719.60	0.009
	121.768 - 120.442					39.000	18.743	-6.71	730.98	0.009
	120.442 - 119.115					39.000	19.035	-6.86	742.35	0.009
	119.115 - 117.788					39.000	19.326	-7.01	753.73	0.009
	117.788 - 116.461					39.000	19.618	-7.17	765.10	0.009
	116.461 - 115.134					39.000	19.910	-7.32	776.48	0.009
	115.134 - 113.807					39.000	20.201	-7.48	787.85	0.009
	113.807 - 112.481					39.000	20.493	-7.64	799.23	0.010
	112.481 - 111.154					39.000	20.785	-7.80	810.60	0.010
	111.154 - 109.827					39.000	21.076	-7.97	821.97	0.010
	109.827 - 108.5					39.000	21.368	-8.13	833.35	0.010
L3	108.5 - 107.464	TP26.38x21.855x0.511	20.42	0.00	0.0	39.000	34.993	-8.31	1364.74	0.006
	107.464 - 106.427					39.000	35.366	-8.48	1379.27	0.006
	106.427 - 105.391					39.000	35.738	-8.65	1393.80	0.006
	105.391 - 104.354					39.000	36.111	-8.82	1408.33	0.006
	104.354 - 103.318					39.000	36.484	-8.99	1422.86	0.006
	103.318 - 102.281					39.000	36.856	-9.16	1437.39	0.006
	102.281 - 101.245					39.000	37.229	-9.33	1451.92	0.006
	101.245 - 100.208					39.000	37.601	-9.50	1466.45	0.006

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 $\frac{P}{P_a}$
	100.208 - 99.1719					39.000	37.974	-9.68	1480.98	0.007
	99.1719 - 98.1354					39.000	38.346	-9.85	1495.51	0.007
	98.1354 - 97.099					39.000	38.719	-10.03	1510.04	0.007
	97.099 - 96.0625					39.000	39.092	-10.20	1524.57	0.007
	96.0625 - 95.026					39.000	39.464	-10.38	1539.10	0.007
	95.026 - 93.9896					39.000	39.837	-10.56	1553.63	0.007
	93.9896 - 92.9531					39.000	40.209	-10.74	1568.16	0.007
	92.9531 - 91.9167					39.000	40.582	-10.92	1582.69	0.007
	91.9167 - 88.0833					39.000	41.960	-5.82	1636.43	0.004
L4	91.9167 - 88.0833	TP26.879x24.905x0.564	8.92	0.00	0.0	39.000	45.116	-6.12	1759.50	0.003
	88.0833 - 87.0667					39.000	45.518	-12.15	1775.22	0.007
	87.0667 - 86.05					39.000	45.921	-12.35	1790.93	0.007
	86.05 - 85.0333					39.000	46.324	-12.55	1806.65	0.007
	85.0333 - 84.0167					39.000	46.727	-12.76	1822.36	0.007
	84.0167 - 83					39.000	47.130	-12.96	1838.08	0.007
L5	83 - 82	TP31.304x26.879x0.587	20.00	0.00	0.0	39.000	49.417	-13.18	1927.28	0.007
	82 - 81					39.000	49.830	-13.39	1943.37	0.007
	81 - 80					39.000	50.242	-13.61	1959.45	0.007
	80 - 79					39.000	50.655	-13.89	1975.54	0.007
	79 - 78					39.000	51.067	-14.10	1991.62	0.007
	78 - 77					39.000	51.480	-14.32	2007.71	0.007
	77 - 76					39.000	51.892	-14.54	2023.80	0.007
	76 - 75					39.000	52.305	-14.76	2039.88	0.007
	75 - 74					39.000	52.717	-14.98	2055.97	0.007
	74 - 73					39.000	53.130	-15.20	2072.05	0.007
	73 - 72					39.000	53.542	-15.42	2088.14	0.007
	72 - 71					39.000	53.954	-15.64	2104.22	0.007
	71 - 70					39.000	54.367	-15.87	2120.31	0.007
	70 - 69					39.000	54.779	-16.09	2136.40	0.008
	69 - 68					39.000	55.192	-16.32	2152.48	0.008
	68 - 67					39.000	55.604	-16.55	2168.57	0.008
	67 - 66					39.000	56.017	-16.77	2184.65	0.008
	66 - 65					39.000	56.429	-17.00	2200.74	0.008
	65 - 64					39.000	56.842	-17.23	2216.82	0.008
	64 - 63					39.000	57.254	-17.46	2232.91	0.008
L6	63 - 61.964	TP35.62x31.304x0.564	19.50	0.00	0.0	39.000	55.431	-17.70	2161.82	0.008
	61.964 - 60.9281					39.000	55.842	-17.94	2177.82	0.008
	60.9281 - 59.8921					39.000	56.252	-18.18	2193.82	0.008
	59.8921 - 58.8562					39.000	56.662	-18.43	2209.83	0.008
	58.8562 - 57.8202					39.000	57.072	-18.67	2225.83	0.008
	57.8202 - 56.7843					39.000	57.483	-18.92	2241.83	0.008
	56.7843 - 55.7483					39.000	57.893	-19.16	2257.83	0.008

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 $\frac{P}{P_a}$
	55.7483 - 54.7124					39.000	58.303	-19.41	2273.83	0.009
	54.7124 - 53.6764					39.000	58.714	-19.66	2289.84	0.009
	53.6764 - 52.6405					39.000	59.124	-19.91	2305.84	0.009
	52.6405 - 51.6045					39.000	59.534	-20.16	2321.84	0.009
	51.6045 - 50.5686					39.000	59.945	-20.41	2337.84	0.009
	50.5686 - 49.5326					39.000	60.355	-20.66	2353.84	0.009
	49.5326 - 48.4967					39.000	60.765	-20.92	2369.85	0.009
	48.4967 - 43.4967					39.000	62.746	-11.78	2447.08	0.005
L7	48.4967 - 43.4967	TP37.194x33.764x0.548	15.50	0.00	0.0	39.000	57.780	-10.32	2253.43	0.005
	43.4967 - 42.447					39.000	59.706	-22.82	2328.53	0.010
	42.447 - 41.3973					39.000	60.110	-23.09	2344.30	0.010
	41.3973 - 40.3477					39.000	60.514	-23.36	2360.06	0.010
	40.3477 - 39.298					39.000	60.919	-23.63	2375.83	0.010
	39.298 - 38.2483					39.000	61.323	-23.90	2391.59	0.010
	38.2483 - 37.1987					39.000	61.727	-24.17	2407.36	0.010
	37.1987 - 36.149					39.000	62.131	-24.45	2423.12	0.010
	36.149 - 35.0993					39.000	62.536	-24.72	2438.89	0.010
	35.0993 - 34.0497					39.000	62.940	-25.00	2454.65	0.010
	34.0497 - 33					39.000	63.344	-25.28	2470.42	0.010
L8	33 - 32 (8)	TP37.416x37.194x0.597	1.00	0.00	0.0	39.000	69.326	-25.55	2703.69	0.009
L9	32 - 31	TP38.301x37.416x0.488	4.00	0.00	0.0	39.000	57.168	-25.85	2229.53	0.012
	31 - 30					39.000	57.510	-26.14	2242.90	0.012
	30 - 29					39.000	57.853	-26.44	2256.27	0.012
	29 - 28					39.000	58.196	-26.73	2269.63	0.012
L10	28 - 26.6	TP44.5x38.301x0.47	28.00	0.00	0.0	39.000	56.405	-27.03	2199.80	0.012
	26.6 - 25.2					39.000	56.867	-27.43	2217.82	0.012
	25.2 - 23.8					39.000	57.329	-27.83	2235.85	0.012
	23.8 - 22.4					39.000	57.792	-28.24	2253.87	0.013
	22.4 - 21					39.000	58.254	-28.64	2271.89	0.013
	21 - 19.6					39.000	58.716	-29.05	2289.91	0.013
	19.6 - 18.2					39.000	59.178	-29.46	2307.93	0.013
	18.2 - 16.8					39.000	59.640	-29.87	2325.96	0.013
	16.8 - 15.4					39.000	60.102	-30.28	2343.98	0.013
	15.4 - 14					39.000	60.564	-30.70	2362.00	0.013
	14 - 12.6					39.000	61.026	-31.12	2380.02	0.013
	12.6 - 11.2					39.000	61.488	-31.53	2398.04	0.013
	11.2 - 9.8					39.000	61.950	-31.95	2416.07	0.013
	9.8 - 8.4					39.000	62.412	-32.38	2434.09	0.013
	8.4 - 7					39.000	62.875	-32.80	2452.11	0.013
	7 - 5.6					39.000	63.337	-33.22	2470.13	0.013
	5.6 - 4.2					39.000	63.799	-33.65	2488.16	0.014
	4.2 - 2.8					39.000	64.261	-34.08	2506.18	0.014

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 $\frac{P}{P_a}$
	2.8 - 1.4					39.000	64.723	-34.51	2524.20	0.014
	1.4 - 0					39.000	65.185	-34.94	2542.22	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	150 - 148.946	TP16.65x13x0.188	5.09	2.461	39.000	0.063	0.00	0.000	39.000	0.000
	148.946 - 147.891		8.02	3.736	39.000	0.096	0.00	0.000	39.000	0.000
	147.891 - 146.837		10.99	4.943	39.000	0.127	0.00	0.000	39.000	0.000
	146.837 - 145.783		14.02	6.087	39.000	0.156	0.00	0.000	39.000	0.000
	145.783 - 144.728		17.10	7.174	39.000	0.184	0.00	0.000	39.000	0.000
	144.728 - 143.674		20.23	8.207	39.000	0.210	0.00	0.000	39.000	0.000
	143.674 - 142.619		23.42	9.190	39.000	0.236	0.00	0.000	39.000	0.000
	142.619 - 141.565		26.66	10.126	39.000	0.260	0.00	0.000	39.000	0.000
	141.565 - 140.511		29.95	11.019	39.000	0.283	0.00	0.000	39.000	0.000
	140.511 - 139.456		36.95	13.171	39.000	0.338	0.00	0.000	39.000	0.000
	139.456 - 138.402		47.13	16.286	39.000	0.418	0.00	0.000	39.000	0.000
	138.402 - 137.348		57.39	19.231	39.000	0.493	0.00	0.000	39.000	0.000
	137.348 - 136.293		67.71	22.016	39.000	0.565	0.00	0.000	39.000	0.000
	136.293 - 133.71		37.09	11.221	39.000	0.288	0.00	0.000	39.000	0.000
L2	136.293 - 133.71	TP21.855x15.696x0.313	56.18	10.944	39.000	0.281	0.00	0.000	39.000	0.000
	133.71 - 132.383		106.55	20.005	39.000	0.513	0.00	0.000	39.000	0.000
	132.383 - 131.056		119.94	21.718	39.000	0.557	0.00	0.000	39.000	0.000
	131.056 - 129.729		134.59	23.520	39.000	0.603	0.00	0.000	39.000	0.000
	129.729 - 128.403		153.85	25.963	39.000	0.666	0.00	0.000	39.000	0.000
	128.403 - 127.076		173.21	28.244	39.000	0.724	0.00	0.000	39.000	0.000
	127.076 - 125.749		192.68	30.376	39.000	0.779	0.00	0.000	39.000	0.000
	125.749 - 124.422		212.26	32.370	39.000	0.830	0.00	0.000	39.000	0.000
	124.422 - 123.095		231.94	34.235	39.000	0.878	0.00	0.000	39.000	0.000
	123.095 - 121.768		251.74	35.982	39.000	0.923	0.00	0.000	39.000	0.000
	121.768 -		271.64	37.618	39.000	0.965	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	120.442									
	120.442 - 119.115		291.65	39.151	39.000	1.004	0.00	0.000	39.000	0.000
	119.115 - 117.788		311.77	40.589	39.000	1.041	0.00	0.000	39.000	0.000
	117.788 - 116.461		332.00	41.937	39.000	1.075	0.00	0.000	39.000	0.000
	116.461 - 115.134		352.34	43.202	39.000	1.108	0.00	0.000	39.000	0.000
	115.134 - 113.807		372.79	44.390	39.000	1.138	0.00	0.000	39.000	0.000
	113.807 - 112.481		393.35	45.505	39.000	1.167	0.00	0.000	39.000	0.000
	112.481 - 111.154		414.03	46.553	39.000	1.194	0.00	0.000	39.000	0.000
	111.154 - 109.827		434.82	47.537	39.000	1.219	0.00	0.000	39.000	0.000
	109.827 - 108.5		455.73	48.462	39.000	1.243	0.00	0.000	39.000	0.000
L3	108.5 - 107.464	TP26.38x21.855x0.511	472.17	30.892	39.000	0.792	0.00	0.000	39.000	0.000
	107.464 - 106.427		488.68	31.295	39.000	0.802	0.00	0.000	39.000	0.000
	106.427 - 105.391		505.28	31.679	39.000	0.812	0.00	0.000	39.000	0.000
	105.391 - 104.354		521.95	32.046	39.000	0.822	0.00	0.000	39.000	0.000
	104.354 - 103.318		538.71	32.395	39.000	0.831	0.00	0.000	39.000	0.000
	103.318 - 102.281		555.54	32.728	39.000	0.839	0.00	0.000	39.000	0.000
	102.281 - 101.245		572.46	33.045	39.000	0.847	0.00	0.000	39.000	0.000
	101.245 - 100.208		589.46	33.348	39.000	0.855	0.00	0.000	39.000	0.000
	100.208 - 99.1719		606.53	33.638	39.000	0.863	0.00	0.000	39.000	0.000
	99.1719 - 98.1354		623.69	33.913	39.000	0.870	0.00	0.000	39.000	0.000
	98.1354 - 97.099		640.94	34.176	39.000	0.876	0.00	0.000	39.000	0.000
	97.099 - 96.0625		658.26	34.428	39.000	0.883	0.00	0.000	39.000	0.000
	96.0625 - 95.026		675.67	34.667	39.000	0.889	0.00	0.000	39.000	0.000
	95.026 - 93.9896		693.16	34.896	39.000	0.895	0.00	0.000	39.000	0.000
	93.9896 - 92.9531		710.74	35.114	39.000	0.900	0.00	0.000	39.000	0.000
	92.9531 - 91.9167		728.40	35.322	39.000	0.906	0.00	0.000	39.000	0.000
	91.9167 - 88.0833		393.75	17.849	39.000	0.458	0.00	0.000	39.000	0.000
L4	91.9167 - 88.0833	TP26.879x24.905x0.564	400.82	17.400	39.000	0.446	0.00	0.000	39.000	0.000
	88.0833 - 87.0667		812.34	34.635	39.000	0.888	0.00	0.000	39.000	0.000
	87.0667 - 86.05		830.19	34.771	39.000	0.892	0.00	0.000	39.000	0.000
	86.05 -		848.12	34.900	39.000	0.895	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	85.0333									
	85.0333 - 84.0167		866.12	35.022	39.000	0.898	0.00	0.000	39.000	0.000
	84.0167 - 83		884.21	35.139	39.000	0.901	0.00	0.000	39.000	0.000
L5	83 - 82	TP31.304x26.879x0.587	902.06	33.956	39.000	0.871	0.00	0.000	39.000	0.000
	82 - 81		919.98	34.054	39.000	0.873	0.00	0.000	39.000	0.000
	81 - 80		937.98	34.147	39.000	0.876	0.00	0.000	39.000	0.000
	80 - 79		956.21	34.240	39.000	0.878	0.00	0.000	39.000	0.000
	79 - 78		974.41	34.324	39.000	0.880	0.00	0.000	39.000	0.000
	78 - 77		992.68	34.404	39.000	0.882	0.00	0.000	39.000	0.000
	77 - 76		1011.03	34.480	39.000	0.884	0.00	0.000	39.000	0.000
	76 - 75		1029.47	34.551	39.000	0.886	0.00	0.000	39.000	0.000
	75 - 74		1047.97	34.618	39.000	0.888	0.00	0.000	39.000	0.000
	74 - 73		1066.55	34.682	39.000	0.889	0.00	0.000	39.000	0.000
	73 - 72		1085.21	34.742	39.000	0.891	0.00	0.000	39.000	0.000
	72 - 71		1103.95	34.798	39.000	0.892	0.00	0.000	39.000	0.000
	71 - 70		1122.76	34.851	39.000	0.894	0.00	0.000	39.000	0.000
	70 - 69		1141.65	34.900	39.000	0.895	0.00	0.000	39.000	0.000
	69 - 68		1160.63	34.947	39.000	0.896	0.00	0.000	39.000	0.000
	68 - 67		1179.68	34.990	39.000	0.897	0.00	0.000	39.000	0.000
	67 - 66		1198.80	35.031	39.000	0.898	0.00	0.000	39.000	0.000
	66 - 65		1218.01	35.069	39.000	0.899	0.00	0.000	39.000	0.000
	65 - 64		1237.30	35.104	39.000	0.900	0.00	0.000	39.000	0.000
	64 - 63		1256.67	35.137	39.000	0.901	0.00	0.000	39.000	0.000
L6	63 - 61.964	TP35.62x31.304x0.564	1276.82	36.541	39.000	0.937	0.00	0.000	39.000	0.000
	61.964 - 60.9281		1297.03	36.572	39.000	0.938	0.00	0.000	39.000	0.000
	60.9281 - 59.8921		1317.33	36.599	39.000	0.938	0.00	0.000	39.000	0.000
	59.8921 - 58.8562		1337.70	36.624	39.000	0.939	0.00	0.000	39.000	0.000
	58.8562 - 57.8202		1358.15	36.647	39.000	0.940	0.00	0.000	39.000	0.000
	57.8202 - 56.7843		1378.68	36.667	39.000	0.940	0.00	0.000	39.000	0.000
	56.7843 - 55.7483		1399.28	36.685	39.000	0.941	0.00	0.000	39.000	0.000
	55.7483 - 54.7124		1419.97	36.700	39.000	0.941	0.00	0.000	39.000	0.000
	54.7124 - 53.6764		1440.72	36.714	39.000	0.941	0.00	0.000	39.000	0.000
	53.6764 - 52.6405		1461.57	36.725	39.000	0.942	0.00	0.000	39.000	0.000
	52.6405 - 51.6045		1482.48	36.735	39.000	0.942	0.00	0.000	39.000	0.000
	51.6045 - 50.5686		1503.47	36.743	39.000	0.942	0.00	0.000	39.000	0.000
	50.5686 - 49.5326		1524.55	36.749	39.000	0.942	0.00	0.000	39.000	0.000
	49.5326 - 48.4967		1545.70	36.753	39.000	0.942	0.00	0.000	39.000	0.000
	48.4967 - 43.4967		862.94	19.234	39.000	0.493	0.00	0.000	39.000	0.000
L7	48.4967 - 43.4967	TP37.194x33.764x0.548	736.87	18.831	39.000	0.483	0.00	0.000	39.000	0.000
	43.4967 - 42.447		1649.11	39.450	39.000	1.012	0.00	0.000	39.000	0.000
	42.447 - 41.3973		1671.08	39.435	39.000	1.011	0.00	0.000	39.000	0.000
	41.3973 -		1693.13	39.419	39.000	1.011	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	40.3477									
	40.3477 - 39.298		1715.24	39.402	39.000	1.010	0.00	0.000	39.000	0.000
	39.298 - 38.2483		1737.43	39.383	39.000	1.010	0.00	0.000	39.000	0.000
	38.2483 - 37.1987		1759.69	39.363	39.000	1.009	0.00	0.000	39.000	0.000
	37.1987 - 36.149		1782.02	39.342	39.000	1.009	0.00	0.000	39.000	0.000
	36.149 - 35.0993		1804.42	39.319	39.000	1.008	0.00	0.000	39.000	0.000
	35.0993 - 34.0497		1826.89	39.295	39.000	1.008	0.00	0.000	39.000	0.000
	34.0497 - 33		1849.43	39.270	39.000	1.007	0.00	0.000	39.000	0.000
L8	33 - 32 (8)	TP37.416x37.194x0.597	1872.05	36.183	39.000	0.928	0.00	0.000	39.000	0.000
L9	32 - 31	TP38.301x37.416x0.488	1893.65	43.853	39.000	1.124	0.00	0.000	39.000	0.000
	31 - 30		1915.33	43.825	39.000	1.124	0.00	0.000	39.000	0.000
	30 - 29		1937.06	43.795	39.000	1.123	0.00	0.000	39.000	0.000
	29 - 28		1958.86	43.764	39.000	1.122	0.00	0.000	39.000	0.000
L10	28 - 26.6	TP44.5x38.301x0.47	1980.72	45.344	39.000	1.163	0.00	0.000	39.000	0.000
	26.6 - 25.2		2011.44	45.297	39.000	1.161	0.00	0.000	39.000	0.000
	25.2 - 23.8		2042.28	45.249	39.000	1.160	0.00	0.000	39.000	0.000
	23.8 - 22.4		2073.24	45.199	39.000	1.159	0.00	0.000	39.000	0.000
	22.4 - 21		2104.31	45.147	39.000	1.158	0.00	0.000	39.000	0.000
	21 - 19.6		2135.49	45.093	39.000	1.156	0.00	0.000	39.000	0.000
	19.6 - 18.2		2166.79	45.038	39.000	1.155	0.00	0.000	39.000	0.000
	18.2 - 16.8		2198.21	44.982	39.000	1.153	0.00	0.000	39.000	0.000
	16.8 - 15.4		2229.73	44.924	39.000	1.152	0.00	0.000	39.000	0.000
	15.4 - 14		2261.38	44.865	39.000	1.150	0.00	0.000	39.000	0.000
	14 - 12.6		2293.15	44.805	39.000	1.149	0.00	0.000	39.000	0.000
	12.6 - 11.2		2325.03	44.744	39.000	1.147	0.00	0.000	39.000	0.000
	11.2 - 9.8		2357.03	44.682	39.000	1.146	0.00	0.000	39.000	0.000
	9.8 - 8.4		2389.14	44.619	39.000	1.144	0.00	0.000	39.000	0.000
	8.4 - 7		2421.38	44.555	39.000	1.142	0.00	0.000	39.000	0.000
	7 - 5.6		2453.72	44.490	39.000	1.141	0.00	0.000	39.000	0.000
	5.6 - 4.2		2486.19	44.425	39.000	1.139	0.00	0.000	39.000	0.000
	4.2 - 2.8		2518.78	44.358	39.000	1.137	0.00	0.000	39.000	0.000
	2.8 - 1.4		2551.49	44.292	39.000	1.136	0.00	0.000	39.000	0.000
	1.4 - 0		2584.32	44.224	39.000	1.134	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	150 - 148.946	TP16.65x13x0.188	2.75	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	148.946 - 147.891		2.80	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	147.891 - 146.837		2.84	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	146.837 - 145.783		2.89	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	145.783 - 144.728		2.94	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	144.728 - 143.674		3.00	0.354	26.000	0.027	0.00	0.000	26.000	0.000

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 $\frac{f_{vt}}{F_{vt}}$
	143.674 - 142.619		3.05	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	142.619 - 141.565		3.10	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	141.565 - 140.511		3.15	0.355	26.000	0.027	0.00	0.000	26.000	0.000
	140.511 - 139.456		9.47	1.048	26.000	0.081	1.33	0.231	26.000	0.009
	139.456 - 138.402		9.65	1.052	26.000	0.081	0.76	0.128	26.000	0.005
	138.402 - 137.348		9.76	1.049	26.000	0.081	0.01	0.001	26.000	0.000
	137.348 - 136.293		9.82	1.039	26.000	0.080	0.01	0.001	26.000	0.000
	136.293 - 133.71		4.01	0.409	26.000	0.031	0.00	0.001	26.000	0.000
L2	136.293 - 133.71	TP21.855x15.696x0.313	5.97	0.377	26.000	0.029	0.01	0.000	26.000	0.000
	133.71 - 132.383		10.06	0.624	26.000	0.048	0.01	0.001	26.000	0.000
	132.383 - 131.056		10.14	0.618	26.000	0.048	0.01	0.001	26.000	0.000
	131.056 - 129.729		14.48	0.867	26.000	0.067	0.41	0.034	26.000	0.001
	129.729 - 128.403		14.56	0.857	26.000	0.066	0.41	0.033	26.000	0.001
	128.403 - 127.076		14.64	0.847	26.000	0.065	0.41	0.032	26.000	0.001
	127.076 - 125.749		14.72	0.837	26.000	0.064	0.41	0.031	26.000	0.001
	125.749 - 124.422		14.80	0.828	26.000	0.064	0.40	0.030	26.000	0.001
	124.422 - 123.095		14.88	0.819	26.000	0.063	0.40	0.029	26.000	0.001
	123.095 - 121.768		14.96	0.811	26.000	0.062	0.40	0.028	26.000	0.001
	121.768 - 120.442		15.04	0.803	26.000	0.062	0.40	0.027	26.000	0.001
	120.442 - 119.115		15.13	0.795	26.000	0.061	0.40	0.026	26.000	0.001
	119.115 - 117.788		15.21	0.787	26.000	0.061	0.40	0.025	26.000	0.001
	117.788 - 116.461		15.29	0.780	26.000	0.060	0.40	0.024	26.000	0.001
	116.461 - 115.134		15.38	0.772	26.000	0.059	0.40	0.024	26.000	0.001
	115.134 - 113.807		15.46	0.765	26.000	0.059	0.40	0.023	26.000	0.001
	113.807 - 112.481		15.55	0.759	26.000	0.058	0.40	0.022	26.000	0.001
	112.481 - 111.154		15.63	0.752	26.000	0.058	0.39	0.022	26.000	0.001
	111.154 - 109.827		15.72	0.746	26.000	0.057	0.39	0.021	26.000	0.001
	109.827 - 108.5		15.81	0.740	26.000	0.057	0.39	0.020	26.000	0.001
L3	108.5 - 107.464	TP26.38x21.855x0.511	15.88	0.454	26.000	0.035	0.39	0.012	26.000	0.000
	107.464 - 106.427		15.95	0.451	26.000	0.035	0.39	0.012	26.000	0.000

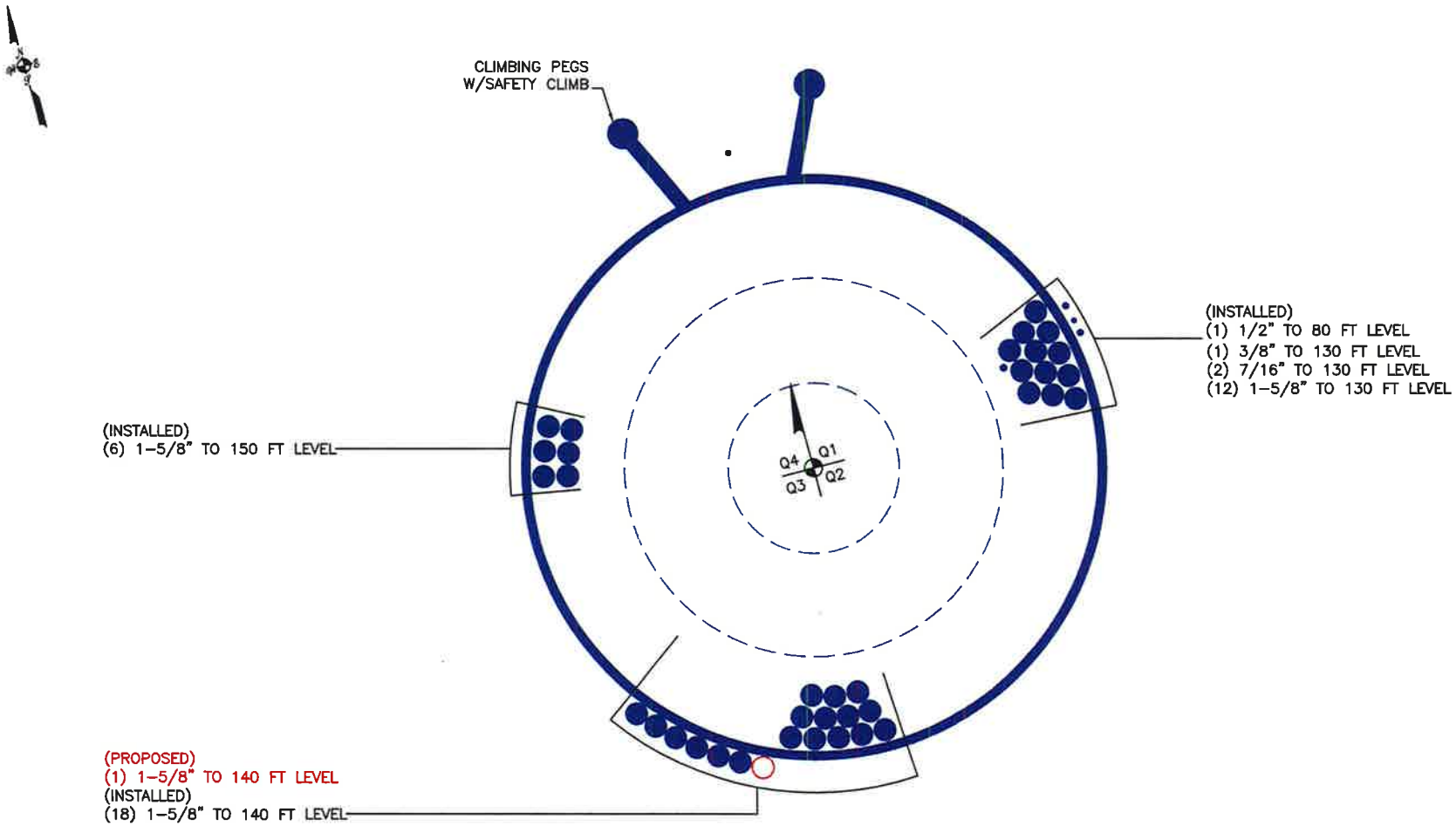
Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	106.427 - 105.391		16.03	0.449	26.000	0.034	0.39	0.012	26.000	0.000
	105.391 - 104.354		16.11	0.446	26.000	0.034	0.39	0.012	26.000	0.000
	104.354 - 103.318		16.18	0.444	26.000	0.034	0.39	0.011	26.000	0.000
	103.318 - 102.281		16.26	0.441	26.000	0.034	0.39	0.011	26.000	0.000
	102.281 - 101.245		16.34	0.439	26.000	0.034	0.39	0.011	26.000	0.000
	101.245 - 100.208		16.42	0.437	26.000	0.034	0.39	0.011	26.000	0.000
	100.208 - 99.1719		16.50	0.434	26.000	0.033	0.39	0.011	26.000	0.000
	99.1719 - 98.1354		16.58	0.432	26.000	0.033	0.39	0.010	26.000	0.000
	98.1354 - 97.099		16.66	0.430	26.000	0.033	0.39	0.010	26.000	0.000
	97.099 - 96.0625		16.74	0.428	26.000	0.033	0.39	0.010	26.000	0.000
	96.0625 - 95.026		16.82	0.426	26.000	0.033	0.39	0.010	26.000	0.000
	95.026 - 93.9896		16.90	0.424	26.000	0.033	0.39	0.010	26.000	0.000
	93.9896 - 92.9531		16.98	0.422	26.000	0.032	0.40	0.009	26.000	0.000
	92.9531 - 91.9167		17.06	0.420	26.000	0.032	0.40	0.009	26.000	0.000
	91.9167 - 88.0833		8.71	0.208	26.000	0.016	0.20	0.004	26.000	0.000
L4	91.9167 - 88.0833	TP26.879x24.905x0.564	8.72	0.193	26.000	0.015	0.20	0.004	26.000	0.000
	88.0833 - 87.0667		17.50	0.385	26.000	0.030	0.40	0.008	26.000	0.000
	87.0667 - 86.05		17.58	0.383	26.000	0.029	0.40	0.008	26.000	0.000
	86.05 - 85.0333		17.66	0.381	26.000	0.029	0.40	0.008	26.000	0.000
	85.0333 - 84.0167		17.74	0.380	26.000	0.029	0.40	0.008	26.000	0.000
	84.0167 - 83		17.82	0.378	26.000	0.029	0.40	0.008	26.000	0.000
L5	83 - 82	TP31.304x26.879x0.587	17.89	0.362	26.000	0.028	0.40	0.007	26.000	0.000
	82 - 81		17.97	0.361	26.000	0.028	0.40	0.007	26.000	0.000
	81 - 80		18.04	0.359	26.000	0.028	0.40	0.007	26.000	0.000
	80 - 79		18.17	0.359	26.000	0.028	0.26	0.004	26.000	0.000
	79 - 78		18.24	0.357	26.000	0.027	0.26	0.004	26.000	0.000
	78 - 77		18.32	0.356	26.000	0.027	0.26	0.004	26.000	0.000
	77 - 76		18.39	0.354	26.000	0.027	0.26	0.004	26.000	0.000
	76 - 75		18.47	0.353	26.000	0.027	0.26	0.004	26.000	0.000
	75 - 74		18.55	0.352	26.000	0.027	0.26	0.004	26.000	0.000
	74 - 73		18.62	0.351	26.000	0.027	0.26	0.004	26.000	0.000
	73 - 72		18.70	0.349	26.000	0.027	0.26	0.004	26.000	0.000
	72 - 71		18.78	0.348	26.000	0.027	0.26	0.004	26.000	0.000
	71 - 70		18.86	0.347	26.000	0.027	0.26	0.004	26.000	0.000
	70 - 69		18.94	0.346	26.000	0.027	0.26	0.004	26.000	0.000
	69 - 68		19.02	0.345	26.000	0.026	0.26	0.004	26.000	0.000
	68 - 67		19.09	0.343	26.000	0.026	0.26	0.004	26.000	0.000
	67 - 66		19.17	0.342	26.000	0.026	0.26	0.004	26.000	0.000
	66 - 65		19.25	0.341	26.000	0.026	0.26	0.004	26.000	0.000
	65 - 64		19.33	0.340	26.000	0.026	0.26	0.004	26.000	0.000

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 $\frac{f_{vt}}{F_{vt}}$
	64 - 63		19.41	0.339	26.000	0.026	0.26	0.004	26.000	0.000
L6	63 - 61.964	TP35.62x31.304x0.564	19.49	0.352	26.000	0.027	0.26	0.004	26.000	0.000
	61.964 - 60.9281		19.56	0.350	26.000	0.027	0.26	0.004	26.000	0.000
	60.9281 - 59.8921		19.63	0.349	26.000	0.027	0.26	0.004	26.000	0.000
	59.8921 - 58.8562		19.71	0.348	26.000	0.027	0.26	0.003	26.000	0.000
	58.8562 - 57.8202		19.78	0.347	26.000	0.027	0.26	0.003	26.000	0.000
	57.8202 - 56.7843		19.86	0.345	26.000	0.027	0.26	0.003	26.000	0.000
	56.7843 - 55.7483		19.93	0.344	26.000	0.026	0.26	0.003	26.000	0.000
	55.7483 - 54.7124		20.01	0.343	26.000	0.026	0.26	0.003	26.000	0.000
	54.7124 - 53.6764		20.08	0.342	26.000	0.026	0.26	0.003	26.000	0.000
	53.6764 - 52.6405		20.16	0.341	26.000	0.026	0.27	0.003	26.000	0.000
	52.6405 - 51.6045		20.23	0.340	26.000	0.026	0.27	0.003	26.000	0.000
	51.6045 - 50.5686		20.31	0.339	26.000	0.026	0.27	0.003	26.000	0.000
	50.5686 - 49.5326		20.39	0.338	26.000	0.026	0.27	0.003	26.000	0.000
	49.5326 - 48.4967		20.46	0.337	26.000	0.026	0.27	0.003	26.000	0.000
	48.4967 - 43.4967		11.05	0.176	26.000	0.014	0.14	0.002	26.000	0.000
L7	48.4967 - 43.4967	TP37.194x33.764x0.548	9.87	0.171	26.000	0.013	0.13	0.002	26.000	0.000
	43.4967 - 42.447		20.98	0.351	26.000	0.027	0.27	0.003	26.000	0.000
	42.447 - 41.3973		21.05	0.350	26.000	0.027	0.27	0.003	26.000	0.000
	41.3973 - 40.3477		21.11	0.349	26.000	0.027	0.27	0.003	26.000	0.000
	40.3477 - 39.298		21.18	0.348	26.000	0.027	0.27	0.003	26.000	0.000
	39.298 - 38.2483		21.25	0.346	26.000	0.026	0.27	0.003	26.000	0.000
	38.2483 - 37.1987		21.32	0.345	26.000	0.026	0.27	0.003	26.000	0.000
	37.1987 - 36.149		21.38	0.344	26.000	0.026	0.27	0.003	26.000	0.000
	36.149 - 35.0993		21.45	0.343	26.000	0.026	0.27	0.003	26.000	0.000
	35.0993 - 34.0497		21.52	0.342	26.000	0.026	0.27	0.003	26.000	0.000
	34.0497 - 33		21.59	0.341	26.000	0.026	0.27	0.003	26.000	0.000
L8	33 - 32 (8)	TP37.416x37.194x0.597	21.65	0.312	26.000	0.024	0.27	0.003	26.000	0.000
L9	32 - 31	TP38.301x37.416x0.488	21.72	0.380	26.000	0.029	0.27	0.003	26.000	0.000
	31 - 30		21.78	0.379	26.000	0.029	0.27	0.003	26.000	0.000
	30 - 29		21.84	0.377	26.000	0.029	0.27	0.003	26.000	0.000
	29 - 28		21.90	0.376	26.000	0.029	0.27	0.003	26.000	0.000
L10	28 - 26.6	TP44.5x38.301x0.47	21.98	0.390	26.000	0.030	0.27	0.003	26.000	0.000
	26.6 - 25.2		22.07	0.388	26.000	0.030	0.27	0.003	26.000	0.000
	25.2 - 23.8		22.15	0.386	26.000	0.029	0.27	0.003	26.000	0.000
	23.8 - 22.4		22.23	0.385	26.000	0.029	0.27	0.003	26.000	0.000

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 $\frac{f_{vt}}{F_{vt}}$
	22.4 - 21		22.31	0.383	26.000	0.029	0.27	0.003	26.000	0.000
	21 - 19.6		22.39	0.381	26.000	0.029	0.27	0.003	26.000	0.000
	19.6 - 18.2		22.48	0.380	26.000	0.029	0.28	0.003	26.000	0.000
	18.2 - 16.8		22.56	0.378	26.000	0.029	0.28	0.003	26.000	0.000
	16.8 - 15.4		22.64	0.377	26.000	0.029	0.28	0.003	26.000	0.000
	15.4 - 14		22.73	0.375	26.000	0.029	0.28	0.003	26.000	0.000
	14 - 12.6		22.81	0.374	26.000	0.029	0.28	0.003	26.000	0.000
	12.6 - 11.2		22.89	0.372	26.000	0.028	0.28	0.003	26.000	0.000
	11.2 - 9.8		22.98	0.371	26.000	0.028	0.28	0.003	26.000	0.000
	9.8 - 8.4		23.06	0.370	26.000	0.028	0.28	0.003	26.000	0.000
	8.4 - 7		23.15	0.368	26.000	0.028	0.28	0.002	26.000	0.000
	7 - 5.6		23.23	0.367	26.000	0.028	0.28	0.002	26.000	0.000
	5.6 - 4.2		23.32	0.365	26.000	0.028	0.28	0.002	26.000	0.000
	4.2 - 2.8		23.40	0.364	26.000	0.028	0.28	0.002	26.000	0.000
	2.8 - 1.4		23.49	0.363	26.000	0.028	0.28	0.002	26.000	0.000
	1.4 - 0		23.58	0.362	26.000	0.028	0.28	0.002	26.000	0.000

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876384 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Pole (L2)	93.9%	Pass
Mod (M3b)	95.3%	Pass

Westbrook / Orsina (BU 876384)
TEP #: 25589.31758
Analysis: GJS 4/24/2015
Check: JLK 4/24/2015

Monopole Reinforcement_v1.4.8 - TIA-222-F

Mod #	Modification Type	Termination Length (ft)	Bot. Elevation (ft)	Top Elevation (ft)	Termination Length (ft)	Modification Location (° or Flat/Point #)	Location (F/P)	Lateral Offset (in)
1	CCI-WSFP-060100	0.00	0.00	35.00		10 16	Flats	0.00
2	CCI-WSFP-060100	0.00	0.00	30.00		1 7	Flats	0.00
3a	CCI-SFP-060100		30.00	65.00		13	Flats	0.00
3b	CCI-SFP-060100	-2.00	30.00	65.00		1 7	Flats	0.00
4	CCI-SFP-060100	-2.00	65.00	85.00		1 7 13	Flats	0.00
5	CCI-SFP-045100	-2.00	85.00	110.00		1 7 13	Flats	0.00

MODIFICATION PROPERTIES

#	Modification	Default Termination (ft)	Stitch (in)	k	Drill Hole (in)	Bolt/Weld Capacity (k)	A_G (in^2)	F_Y (ksi)	F_U (ksi)
1	CCI-WSFP-060100	2.00	16.00	0.80	1.1875	30.0	6.00	65.0	80.0
3	CCI-SFP-060100	2.00	16.00	0.80	1.1875	30.0	6.00	65.0	80.0
5	CCI-SFP-045100	1.50	20.00	0.80	1.1875	30.0	4.50	65.0	80.0

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Pole (L2)	93.9%	Pass
Mod (M3b)	95.3%	Pass

Westbrook / Orsina (BU 876384)
TEP #: 25589.31758
Analysis: GJS 4/24/2015
Check: JLK 4/24/2015

Monopole Reinforcement_v1.4.8 - TIA-222-F - Capacities

Section No.	*Elevation (ft)*	*Type*	*Size*	*Critical Element*	*P (k)*	*Pa (k)*	*% Capacity*	*Pass/Fail*
L1	150.00-133.71	Pole	TP16.65×13.00×0.1875	1	Note 1	Note 1	43.0	Pass
L2	136.29-88.08	Pole	TP26.38×15.70×0.3125	2	Note 1	Note 1	93.9	Pass
L3	91.92-43.50	Pole	TP35.62×24.91×0.3750	3	Note 1	Note 1	71.4	Pass
L4	48.50-0.00	Pole	TP44.50×33.76×0.3750	4	Note 1	Note 1	85.2	Pass
M1	35.00-0.00	Mod (Pr)	CCI-WSFP-060100	1	Note 1	Note 1	86.8	Pass
M2	30.00-0.00	Mod (Pr)	CCI-WSFP-060100	2	Note 1	Note 1	86.8	Pass
M3b	65.00-30.00	Mod (Pr)	CCI-SFP-060100	3	Note 1	Note 1	95.3	Pass
M4	85.00-65.00	Mod (Pr)	CCI-SFP-060100	4	Note 1	Note 1	85.6	Pass
M5	110.00-85.00	Mod (Pr)	CCI-SFP-045100	5	Note 1	Note 1	94.8	Pass

	Summary	
Pole (L2)	93.9	Pass
Mod (M3b)	95.3	Pass
RATING =	**95.3**	**Pass**

*Note 1: See additional documentation in following sheets for details.

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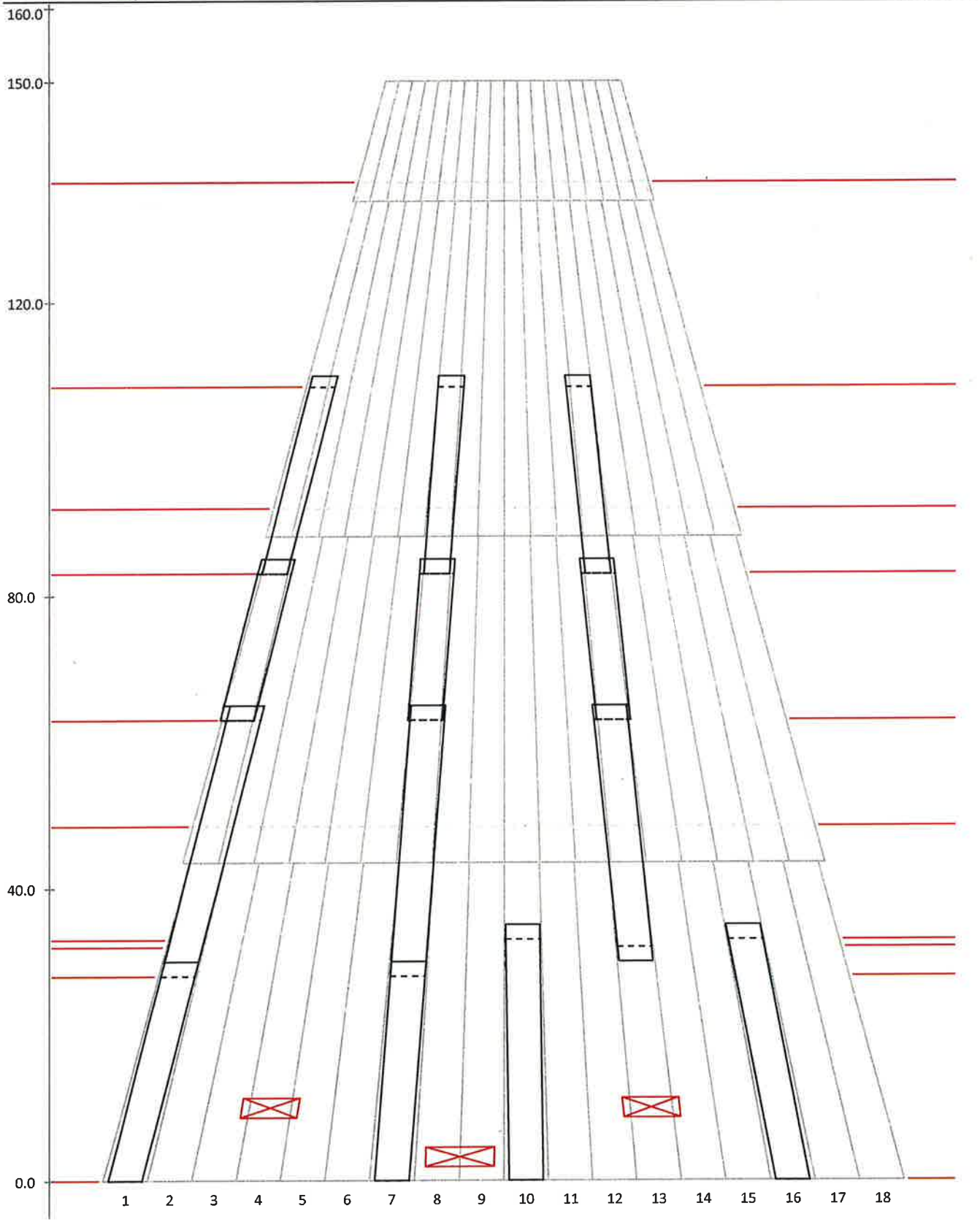
Reinforcement Layout



Elevation: 0.00-ft

Loads	
Axial:	35.3 k
Moment:	2,617.1 k·ft
Shear:	23.6 k
Torsion:	0.3 k·ft

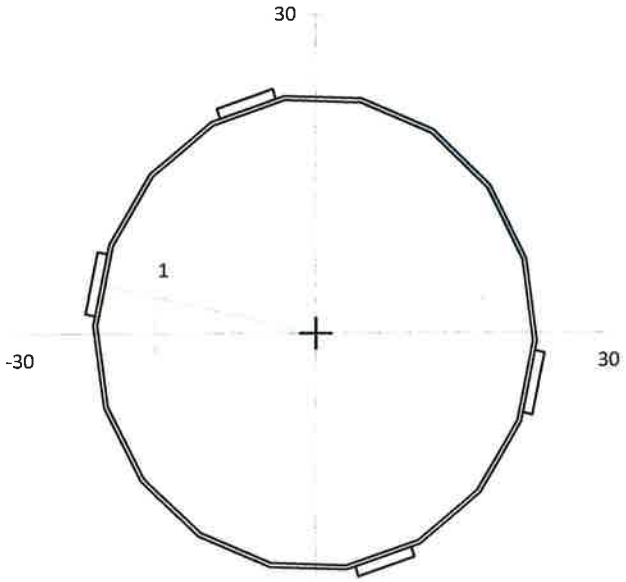
Equivalent Loads to Pole	
Axial:	24.3 k
Moment:	2,094.8 k·ft
Shear:	16.2 k
Torsion:	0.3 k·ft

Shear Flow	
Controlling Mod:	1
q:	0.162 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	184.73 in
Stitch:	16.00 in
Capacity:	8.7%

Pole Info	
OD:	44.50 in
t:	0.3750 in
Pole A_G:	52.52 in^2
Pole I_G:	12,919.0 in^4

Controlling	
Angle:	281.95°
I_{CONT}:	18,838.6 in^4
A_G:	76.52 in^2

Minimum	
Angle:	60.00°
I_{MIN}:	16,078.9 in^4
t_{EFF}:	0.4697 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
245.70	22.54	16139.8	0.462	43.863	52.000	52.000	85.2%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
1	1	198.05	21.63	18838.6	0.462	36.059	42.057	42.222	86.8%
1	2	281.95	21.63	18838.6	0.462	36.059	42.057	42.222	86.8%
2	1	18.05	21.63	18838.6	0.462	36.059	42.057	42.222	86.8%
2	2	101.95	21.63	18838.6	0.462	36.059	42.057	42.222	86.8%

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Elevation: 28.00-ft

Loads	
Axial:	27.0 k
Moment:	1,980.6 k·ft
Shear:	21.9 k
Torsion:	0.3 k·ft

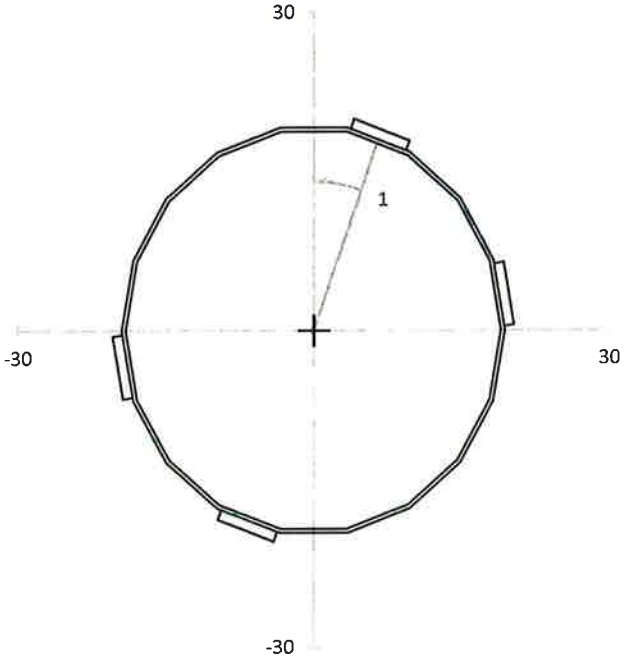
Pole Info	
OD:	38.30 in
t:	0.3750 in
Pole A_G:	45.14 in^2
Pole I_G:	8,203.4 in^4

Equivalent Loads to Pole	
Axial:	17.6 k
Moment:	1,530.5 k·ft
Shear:	14.3 k
Torsion:	0.3 k·ft

Controlling	
Angle:	19.95°
I_G:	12,478.8 in^4
A_G:	69.14 in^2

Shear Flow	
Controlling Mod:	4
q:	0.194 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	154.27 in
Stitch:	16.00 in
Capacity:	10.4%

Minimum	
Angle:	60.00°
I_{MIN}:	10,574.8 in^4
t_{EFF}:	0.4877 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
65.40	19.39	10615.5	0.391	43.421	52.000	52.000	84.3%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
1	1	199.95	18.47	12478.8	0.391	35.180	42.057	42.222	84.6%
1	2	280.05	18.47	12478.8	0.391	35.180	42.057	42.222	84.6%
3b	1	19.95	18.47	12478.8	0.391	35.180	42.057	42.222	84.6%
3b	2	100.05	18.47	12478.8	0.391	35.180	42.057	42.222	84.6%

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Elevation: 32.00-ft

Loads	
Axial:	25.8 k
Moment:	1,893.5 k·ft
Shear:	21.7 k
Torsion:	0.3 k·ft

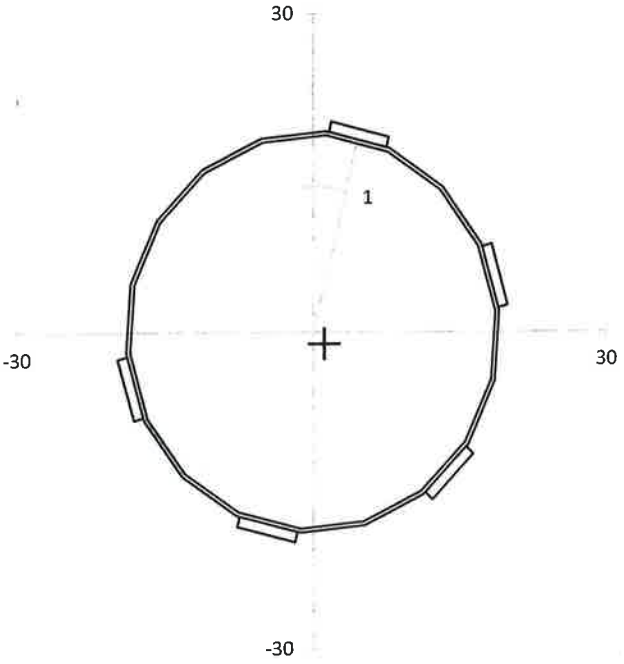
Pole Info	
OD:	37.42 in
t:	0.3750 in
Pole A_G:	44.09 in^2
Pole I_G:	7,642.1 in^4

Equivalent Loads to Pole	
Axial:	15.4 k
Moment:	1,212.4 k·ft
Shear:	12.9 k
Torsion:	0.3 k·ft

Controlling	
Angle:	14.05°
I_G:	13,172.2 in^4
A_G:	74.09 in^2

Shear Flow	
Controlling Mod:	4
q:	0.194 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	154.29 in
Stitch:	16.00 in
Capacity:	10.4%

Minimum	
Angle:	60.00°
I_{MIN}:	11,945.1 in^4
t_{EFF}:	0.5968 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
66.65	20.52	11977.0	0.349	38.929	52.000	52.000	75.5%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
1	1	185.20	18.23	13531.3	0.349	30.616	42.057	42.222	73.6%
1	2	294.80	18.23	13531.3	0.349	30.616	42.057	42.222	73.6%
3a	1	240.00	17.65	11945.1	0.349	33.578	42.057	42.222	80.7%
3b	1	14.05	19.71	13172.2	0.349	34.008	42.057	42.222	81.7%
3b	2	105.95	19.71	13172.2	0.349	34.008	42.057	42.222	81.7%

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Elevation: 33.00-ft

Loads	
Axial:	25.5 k
Moment:	1,871.9 k-ft
Shear:	21.6 k
Torsion:	0.3 k-ft

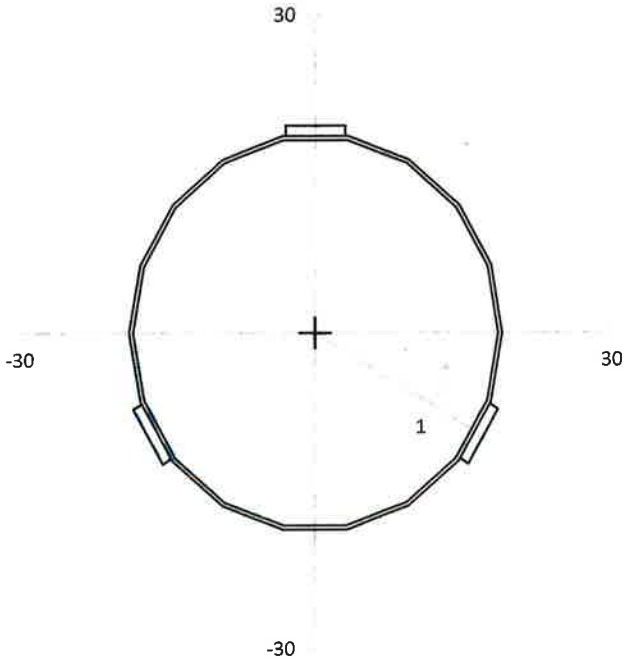
Pole Info	
OD:	37.19 in
t:	0.3750 in
Pole A_G:	43.82 in^2
Pole I_G:	7,505.9 in^4

Equivalent Loads to Pole	
Axial:	18.1 k
Moment:	1,299,0 k-ft
Shear:	15.3 k
Torsion:	0.3 k-ft

Controlling	
Angle:	120.00°
I_G:	10,816.0 in^4
A_G:	61.82 in^2

Shear Flow	
Controlling Mod:	4
q:	0.229 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	131.17 in
Stitch:	16.00 in
Capacity:	12.2%

Minimum	
Angle:	298.00°
I_{MIN}:	10,816.0 in^4
t_{EFF}:	0.5481 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	18.89	10816.0	0.413	39.241	52.000	52.000	76.3%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
3a	1	240.00	19.10	10816.0	0.413	39.661	42.057	42.222	95.3%
3b	1	0.00	19.10	10816.0	0.413	39.661	42.057	42.222	95.3%
3b	2	120.00	19.10	10816.0	0.413	39.661	42.057	42.222	95.3%

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Elevation: 48.50-ft

Loads	
Axial:	20.9 k
Moment:	1,545.7 k·ft
Shear:	20.5 k
Torsion:	0.3 k·ft

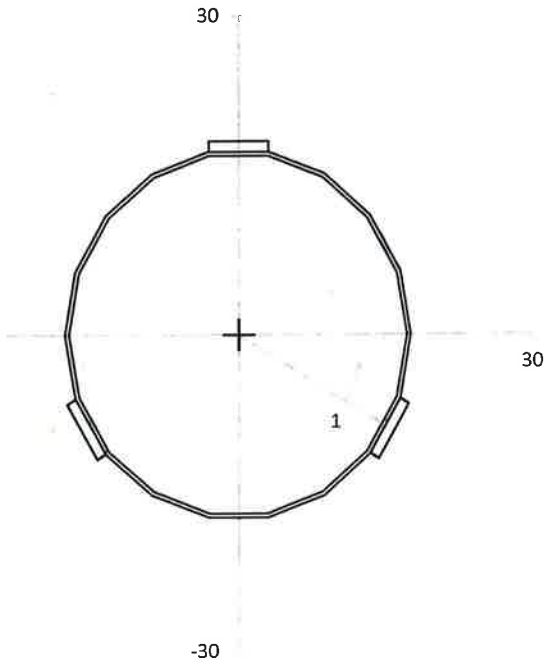
Equivalent Loads to Pole	
Axial:	14.5 k
Moment:	1,045.1 k·ft
Shear:	14.2 k
Torsion:	0.3 k·ft

Shear Flow	
Controlling Mod:	4
q:	0.246 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	121.76 in
Stitch:	16.00 in
Capacity:	13.1%

Pole Info
OD: 34.51 in
t: 0.3750 in
Pole A_G: 40.63 in^2
Pole I_G: 5,982.9 in^4

Controlling
Angle: 120.00°
I_G: 8,848.4 in^4
A_G: 58.63 in^2

Minimum
Angle: 111.90°
I_{MIN}: 8,848.4 in^4
t_{EFF}: 0.5639 in



Pole Segment: L3, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
130.00	17.53	8848.4	0.357	36.752	52.000	52.000	71.4%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
3a	1	240.00	17.76	8848.4	0.357	37.222	42.057	42.222	89.4%
3b	1	360.00	17.76	8848.4	0.357	37.222	42.057	42.222	89.4%
3b	2	120.00	17.76	8848.4	0.357	37.222	42.057	42.222	89.4%

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Elevation: 63.00-ft

Loads	
Axial:	17.5 k
Moment:	1,256.6 k-ft
Shear:	19.4 k
Torsion:	0.3 k-ft

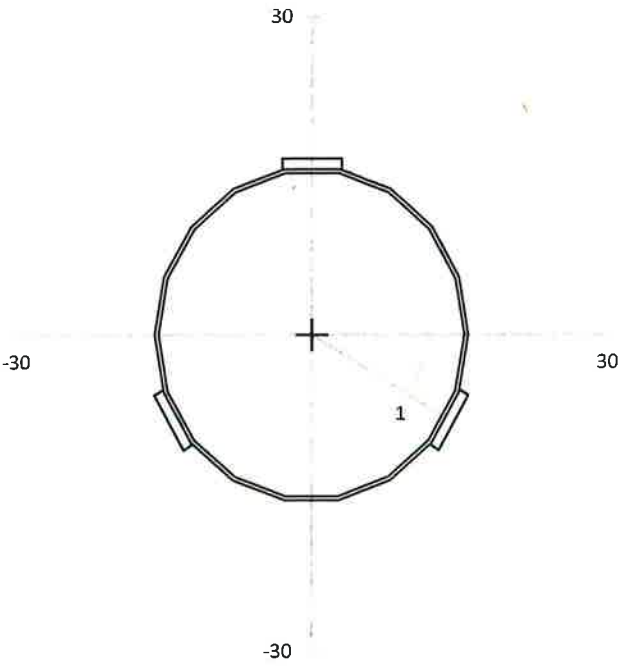
Pole Info	
OD:	31.30 in
t:	0.3750 in
Pole A_G:	36.81 in^2
Pole I_G:	4,449.2 in^4

Equivalent Loads to Pole	
Axial:	11.7 k
Moment:	819.2 k-ft
Shear:	13.0 k
Torsion:	0.3 k-ft

Controlling	
Angle:	**120.00°**
I_G:	6,825.0 in^4
A_G:	54.81 in^2

Shear Flow	
Controlling Mod:	5
q:	0.276 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	108.84 in
Stitch:	16.00 in
Capacity:	**14.7%**

Minimum	
Angle:	**120.20°**
I_{MIN}:	6,825.0 in^4
t_{EFF}:	0.5872 in



Pole Segment: L3, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	15.90	6825.0	0.319	35.135	52.000	52.000	68.2%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
4	1	0.00	16.15	6825.0	0.319	35.686	42.057	42.222	85.6%
4	2	120.00	16.15	6825.0	0.319	35.686	42.057	42.222	85.6%
4	3	240.00	16.15	6825.0	0.319	35.686	42.057	42.222	85.6%

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Elevation: 83.00-ft

Loads	
Axial:	13.0 k
Moment:	884.1 k-ft
Shear:	17.8 k
Torsion:	0.4 k-ft

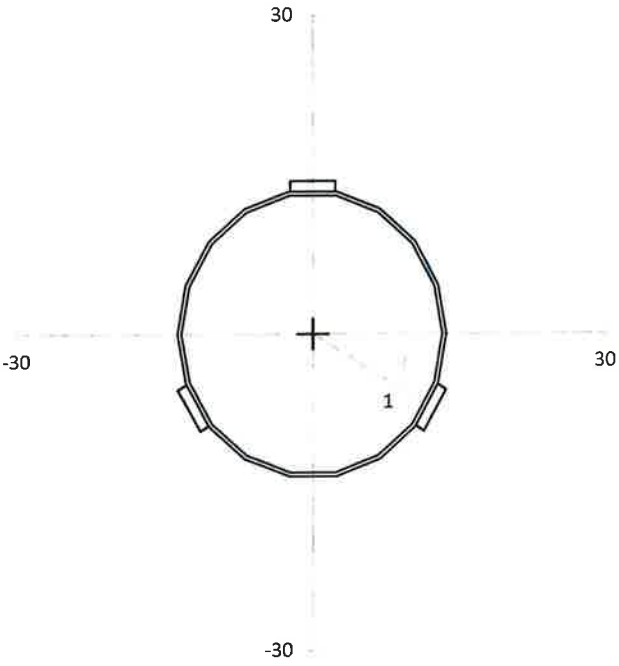
Pole Info	
OD:	26.88 in
t:	0.3750 in
Pole A_G:	31.55 in^2
Pole I_G:	2,799.6 in^4

Equivalent Loads to Pole	
Axial:	9.1 k
Moment:	600.3 k-ft
Shear:	12.5 k
Torsion:	0.4 k-ft

Controlling	
Angle:	120.00°
I_G:	4,123.1 in^4
A_G:	45.05 in^2

Shear Flow	
Controlling Mod:	6
q:	0.271 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	110.68 in
Stitch:	20.00 in
Capacity:	18.1%

Minimum	
Angle:	109.60°
I_{MIN}:	4,123.1 in^4
t_{EFF}:	0.5643 in



Pole Segment: L3, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	13.65	4123.1	0.288	35.136	52.000	52.000	68.1%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
5	1	0.00	13.94	4123.1	0.288	35.869	38.419	38.519	94.1%
5	2	120.00	13.94	4123.1	0.288	35.869	38.419	38.519	94.1%
5	3	240.00	13.94	4123.1	0.288	35.869	38.419	38.519	94.1%

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Elevation: 91.92-ft

Loads	
Axial:	10.9 k
Moment:	728.4 k·ft
Shear:	17.1 k
Torsion:	0.4 k·ft

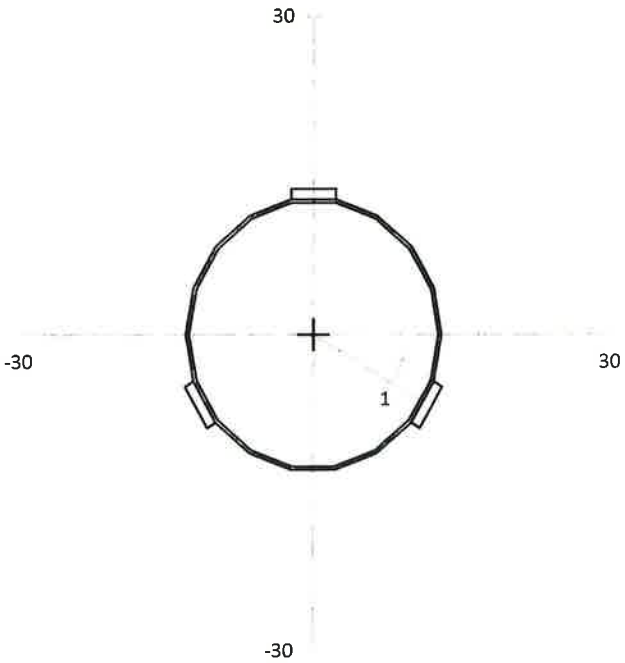
Pole Info	
OD:	25.53 in
t:	0.3125 in
Pole A_G:	25.01 in^2
Pole I_G:	2,009.7 in^4

Equivalent Loads to Pole	
Axial:	7.1 k
Moment:	456.1 k·ft
Shear:	11.1 k
Torsion:	0.4 k·ft

Controlling	
Angle:	120.00°
I_G:	3,209.4 in^4
A_G:	38.51 in^2

Shear Flow	
Controlling Mod:	6
q:	0.317 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	94.54 in
Stitch:	20.00 in
Capacity:	21.2%

Minimum	
Angle:	113.50°
I_{MIN}:	3,209.4 in^4
t_{EFF}:	0.5110 in



Pole Segment: L2, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	12.97	3209.4	0.284	35.323	52.000	52.000	68.5%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
5	1	0.00	13.27	3209.4	0.284	36.129	38.419	38.519	94.8%
5	2	120.00	13.27	3209.4	0.284	36.129	38.419	38.519	94.8%
5	3	240.00	13.27	3209.4	0.284	36.129	38.419	38.519	94.8%

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Elevation: 108.50-ft

Loads	
Axial:	8.1 k
Moment:	455.7 k·ft
Shear:	15.8 k
Torsion:	0.4 k·ft

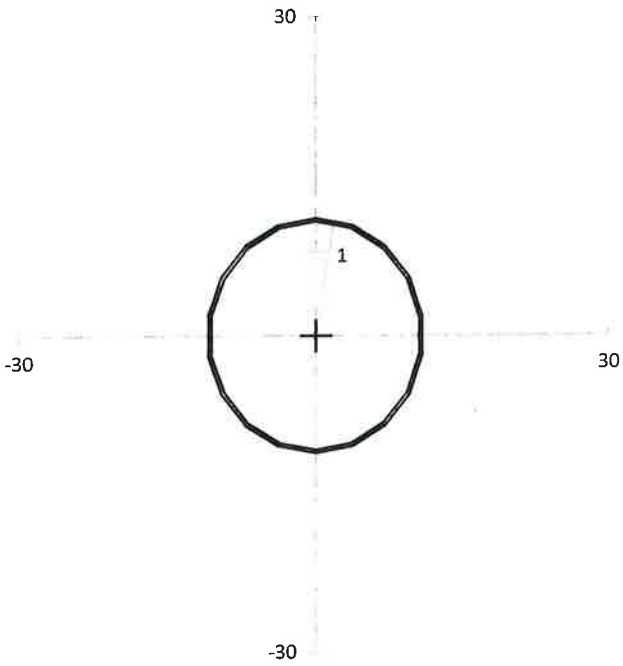
Equivalent Loads to Pole	
Axial:	8.1 k
Moment:	455.7 k·ft
Shear:	15.8 k
Torsion:	0.4 k·ft

Shear Flow N/A

Pole Info	
OD:	21.86 in
t:	0.3125 in
Pole A_G:	21.37 in^2
Pole I_G:	1,252.9 in^4

Controlling	
Angle:	10.00°
I_G:	1,252.9 in^4
A_G:	21.37 in^2

Minimum	
Angle:	0.00°
I_{MIN}:	1,252.9 in^4
t_{EFF}:	0.3125 in



Pole Segment: L2, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
10.00	11.10	1252.9	0.381	48.460	52.000	52.000	93.9%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity

Elevation: 136.29-ft

Loads	
Axial:	3.3 k
Moment:	67.7 k·ft
Shear:	9.8 k
Torsion:	0.0 k·ft

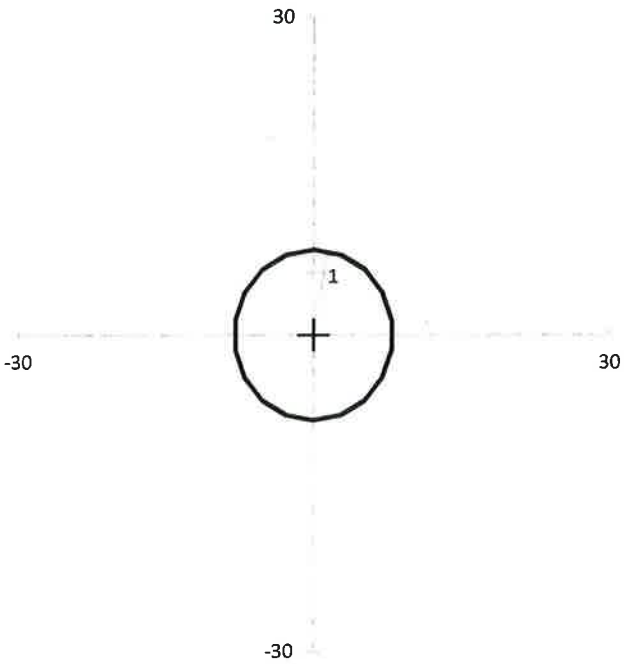
Pole Info	
OD:	16.07 in
t:	0.1875 in
Pole A_G:	9.45 in^2
Pole I_G:	301.3 in^4

Equivalent Loads to Pole	
Axial:	3.3 k
Moment:	67.7 k·ft
Shear:	9.8 k
Torsion:	0.0 k·ft

Controlling	
Angle:	10.00°
I_G:	301.3 in^4
A_G:	9.45 in^2

Shear Flow N/A

Minimum	
Angle:	0.00°
I_{MIN}:	301.3 in^4
t_{EFF}:	0.1875 in



Pole Segment: L1, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
10.00	8.16	301.3	0.346	22.005	52.000	52.000	43.0%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity

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

TIA Rev F

Site Data

BU#: *876384*
Site Name: *Westbrook / Orsina*
App #: *244207 Rev. 3*

Pole Manufacturer:	*Other*

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	53	in

Plate Data		
Diam:	59	in
Thick:	1.75	in
Grade:	60	ksi
Single-Rod B-eff:	11.77	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Groove	
Groove Depth:	0.375	in **
Groove Angle:	45	degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:	0.375	in
Width:	7	in
Height:	18	in
Thick:	0.75	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	44.5	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	2617	ft-kips
Axial:	35	kips
Shear:	24	kips

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

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	194.6 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	99.8% Pass	

Base Plate Results Flexural Check

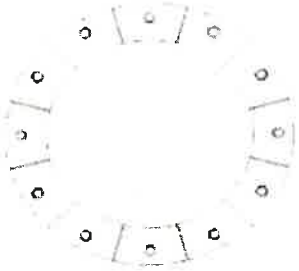
		Stiffened
Base Plate Stress:	59.3 ksi	Service, ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	98.9% Pass	Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	73.3% Pass
Vertical Weld:	55.5% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	26.8% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	74.2% Pass
Plate Comp. (AISC Bracket):	80.9% Pass

Pole Results

Pole Punching Shear Check:	16.7% 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

TOWER ENGINEERING PROFESSIONALS

JOB:	Westbrook / Orsina (BU 876384); TEP No. 25589.31758		
SHEET NUMBER:	1	OF	2
CALCULATED BY:	GJS	DATE	4/23/2015
CHECKED BY:	JLK	DATE	4/23/2015

Pad and Pier Foundation for Monopole - TIA-222-F

Q_a, ALLOWABLE SOIL PRESS. (ksf)	4
NET or GROSS	NET
SOIL DENSITY (pcf)	100

F'c (ksi)	4
F'y (ksi)	60

Base Reactions LC1: Maximum Wind

M , MOMENT (k-ft)	2617.0
P_t, TOTAL DOWNLOAD (k)	35.0
H, HORIZONTAL SHEAR (k)	24.0

Base Reaction LC 2: Ice Wind + Ice

M (k-ft)	713.0
P_t (k)	46.0
H (k)	6.0

Try:	L (ft.)	B (ft.)	t (ft.)	Soil depth to TOP of mat (ft.)	Soil depth to BOT. of mat (ft.)	Pier dia./width (ft.)	Pier Height, h (cu.ft.)	Pier Shape
	28	28	3	2	5	6.00	3.00	Square

W_m, Weight of Mat (k) =	352.8
W_p, Weight of Pier (k) =	16.2
W_s, WEIGHT OF SOIL (k) =	149.6

Concrete Vol. (cu yd) 91.11

CHECK DESIGN CRITERIA

CHECK STABILITY:	LC1	LC2		
Mst= P * (L/2) + (Vf+s * L/2) =	7750.4 k-ft	7904.4 k-ft		
Mot = M+H*(t+h) =	2761.0 k-ft	749 k-ft		
SF =Mot/Mst =	2.81 > 1.5	10.55 > 1.5	Capacity:	53.4%

CHECK BEARING PRESSURE	LC1	LC2		
$P = P_t + W_f + W_s$ =	553.6 k	564.6 k		
e = M / P =	4.99 ft	1.33 ft		
L/6 =	4.67 ft	4.67 ft		
Width of Wedge, L' =	27.04 ft	28.00 ft		
0 Deg Wind: Qmax =	0.96 ksf	0.42 ksf		
45 Deg Wind: Qmax =	1.32 ksf	0.51 ksf	Capacity:	32.9%

TOWER ENGINEERING PROFESSIONALS

JOB:	Westbrook / Orsina (BU 876384); TEP No. 25589.31758		
SHEET NUMBER:	2	OF	2
CALCULATED BY:	GJS	DATE	4/23/2015
CHECKED BY:	JLK	DATE	4/23/2015

CHECK ONE WAY SHEAR

Vu = 376.8 k
Vc = 1020.0 k

Capacity: 36.94%

CHECK TWO WAY SHEAR: PUNCHING + UNBALANCED MOMENT

v_u = 34.9 psi
φv_c = 189.7 psi

Capacity: 18.41%

CALCULATE REINFORCING REQUIRED

F'c = 4.0 ksi F'y = 60.0 ksi

Temp & Shrinkage reinforcing, $A_{s,\,temp}$ = 0.39 in^2/ft (ACI 318 Sec. 10.5.4)

BOTTOM REINFORCING

Bar Size = 8
Bar Spacing, c-c: 12.3
d = 31.5 in.
Mu= 588.3 in-k/ft

φMn=0.9*As*Fy*d(1-0.59*As*Fy/(b*d*F'c))

Solution: As,req = 0.35 in^2/ft

Check, As = 0.77 in^2/ft

Capacity: 45.06%

TOP REINFORCING

Bar Size = 8
Bar Spacing, c-c: 13.8
d= 31.5 in.
Mu= 462.6 in-k/ft

φMn=0.9*As*Fy*d(1-0.59*As*Fy/(b*d*F'c))

Solution: As,req = 0.27 in^2/ft **As,req < As,t, Use As,t**

Bar Spacing, c-c:

Check, As = 0.69 in^2/ft **Top Reinforcing O.K.**

Capacity: 39.70%

TOWER ENGINEERING PROFESSIONALS

Drilled Caisson Tool - Pier Check

	LC1	LC2
Results Summary:	PASS	PASS
Soil Interaction:	N/A	N/A
Foundation Structural:	44.0%	11.9%

Westbrook / Orsina (BU 876384)

TEP #:	25589.31758	
Analysis:	GJS	4/23/2015
Check:	JLK	4/23/2015

Code Revisions: TIA-222-F ACI 318-02

Tower Type: Monopole

	LC1	LC2	
Moment:	2,689.00	731.00	kip-ft
Axial (download):	35.00	46.00	kip
Shear:	24.00	6.00	kip
Axial (uplift):			kip

Shaft Information

Diameter:	6.00	ft
Projection:	1.00	ft
Caisson Length:	3.00	ft
f'c:	4.000	ksi
Max εc:	0.003	in/in

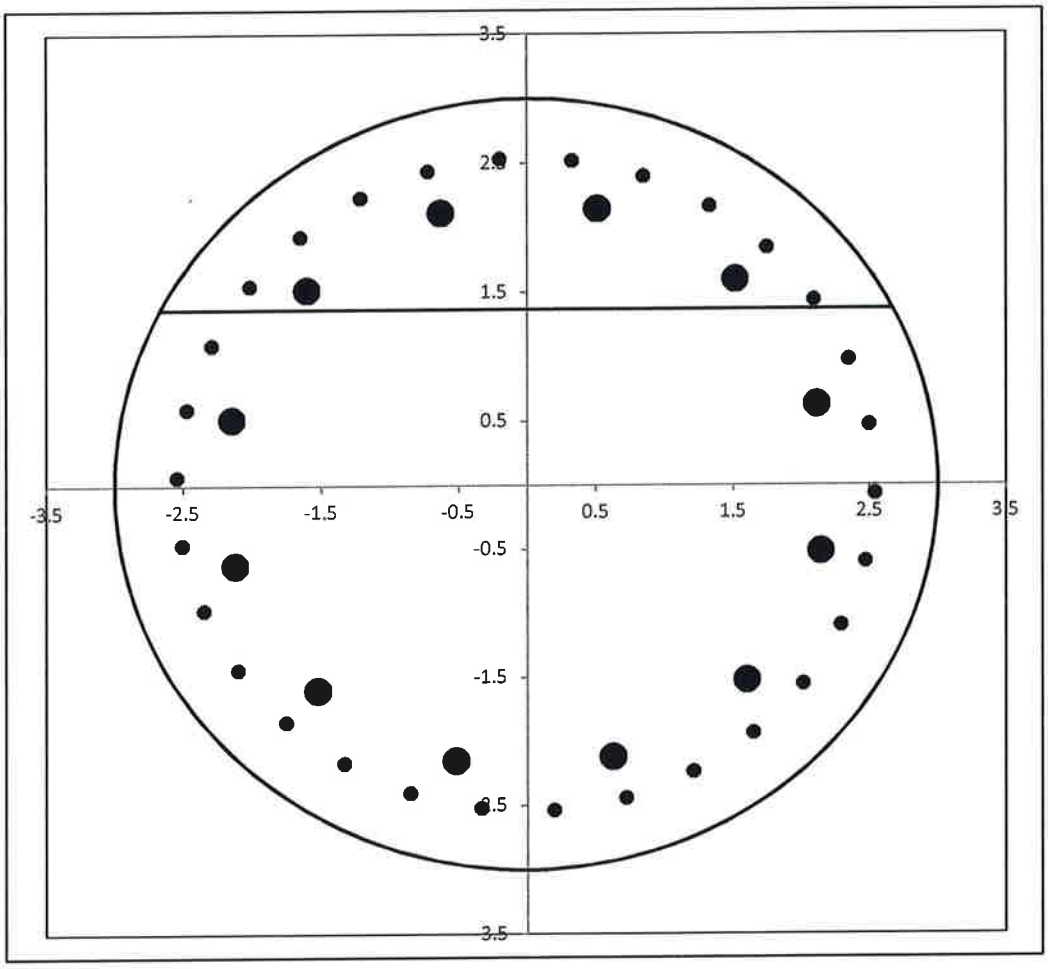
Cage 1 Reinforcement

Tie Bar Size:	4	*(fy = 60.0 ksi)*
Clear Cover to Tie:	4.50	*in (Cage Ø = 61.00in)*
Tie Bar Spacing:	10.00	in
Vertical Bar Size:	8	
Vertical Bar Quantity:	30	*(ρ =0.582%)*
fy:	60.0	ksi
E:	29,000	ksi

Cage 2 Reinforcement

Cage Diameter:	53.00	in
Offset Angle:	0.0	degrees
Vertical Bar Size:	Other	**→ Anet =** 3.25
Vertical Bar Qty:	12	*(ρ =0.958%)*
Cage 2 resists compression?	No	
Effective Cage Depth:	3	ft
fy:	75	ksi
E:	29,000	ksi

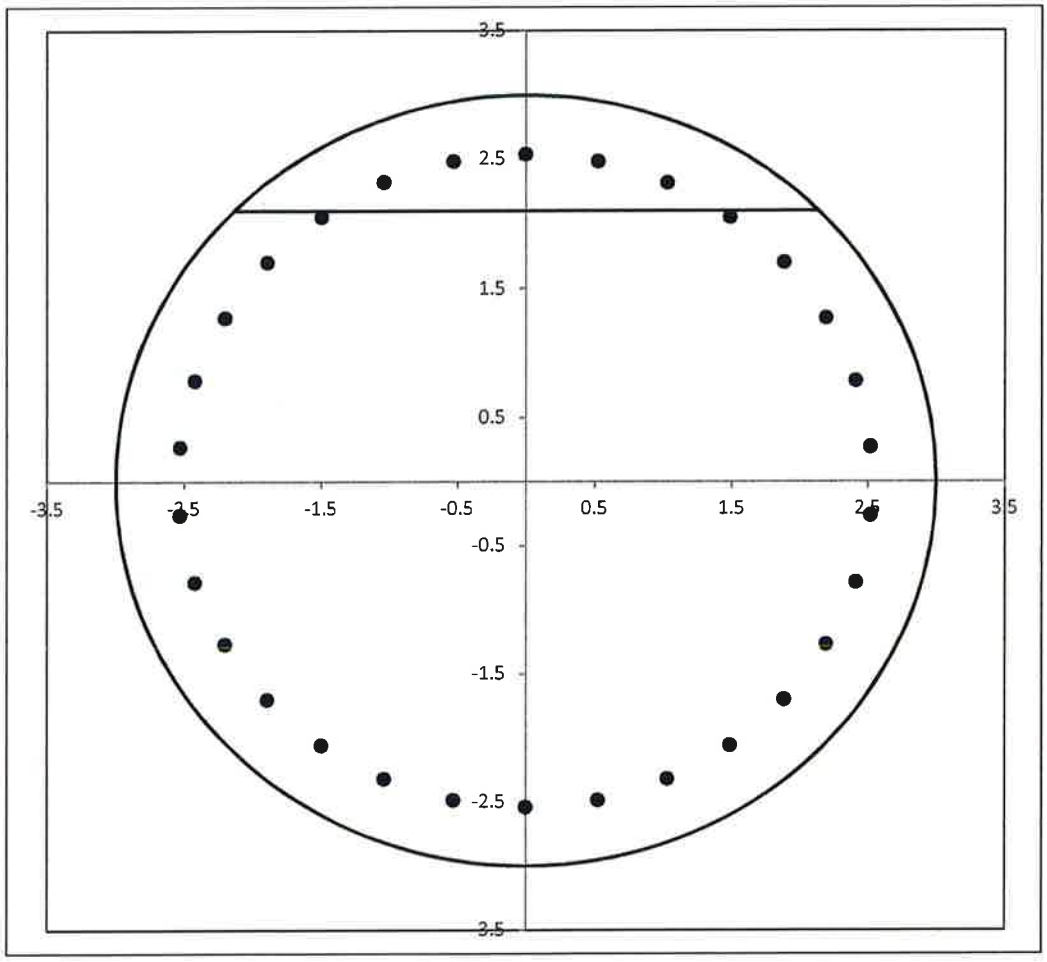
Reinforcement Capacity



		LC1	LC2	
	Vu =	31.2	31.2	kip
	Vc =	517.2	517.9	kip
fy,tie = 60.0	Vs =	159.2	159.2	kip
	ϕVn =	507.3	507.8	kip
	Capacity =	6.2%	6.1%	
		PASS	PASS	

		LC1	LC2	
	Mu =	3495.7	950.3	kip-ft
	ϕMn =	7952.4	7972.3	kip-ft
	Capacity =	44.0%	11.9%	
		PASS	PASS	

Reinforcement Capacity, continued



	LC1	LC2	
Mu =	0.0	0.0	kip-ft
ϕMn =	3283.9	3315.3	kip-ft
Capacity =	0.0%	0.0%	
	PASS	**PASS**	

APPENDIX D

STRUCTURAL DESIGN DRAWINGS

STRUCTURAL DESIGN DRAWINGS

SITE NAME:

WESTBROOK / ORSINA

CROWN CASTLE BU NUMBER:

876384

APPLICATION NUMBER:

244207 REV. 3

SITE ADDRESS:

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)
N 41° 19' 12.70", W 72° 26' 32.20"

MODIFICATION PROVISIONS

THE MODIFICATIONS DEPICTED ON THESE DRAWINGS ARE BASED ON THE RECOMMENDATIONS OUTLINED IN THE STRUCTURAL MODIFICATION ANALYSIS REPORT COMPLETED BY TOWER ENGINEERING PROFESSIONALS (TEP), JOB#: 25589.31758 DATED APRIL 24, 2015 (REV 0). THIS REPORT IS BASED ON A SPECIFIC ANTENNA LOADING AND COAX CONFIGURATION. SEE THE REPORT FOR THE ANTENNA AND COAX LOADING INFORMATION. ANY OTHER ANTENNA OR COAX CONFIGURATION REQUIRES REVIEW BY TEP. SATISFACTORY COMPLETION OF THE MODIFICATIONS INDICATED ON THESE DRAWINGS WILL RESULT IN THE STRUCTURE MEETING THE REQUIREMENTS OF THE SPECIFICATIONS UNDER WHICH THE STRUCTURAL WAS COMPLETED.

CONTRACTOR SHALL FIELD VERIFY ALL: DIMENSIONS, QUANTITIES, PART NUMBERS AND COAX/ANTENNA PLACEMENTS PRIOR TO: BIDDING ORDERING MATERIALS, AND CONSTRUCTION.

REVISION NOTES

1	REVISED MODIFICATION DRAWINGS

INDEX OF SHEETS

PROJECT TEAM

CCI MODIFICATION PROJECT MANAGER:

NAME	CROWN CASTLE
ADDRESS	3530 TORINGDON WAY, SUITE 300
CITY, STATE, ZIP	CHARLOTTE, NC 28277
CONTACT	JOHN MCGEE
PHONE	(980) 209-8253
EMAIL	JOHN.MCGEE@CROWNCASTLE.COM

ENGINEERING FIRM PROJECT MANAGER:

NAME	TOWER ENGINEERING PROFESSIONALS, INC.
ADDRESS	326 TRYON ROAD
CITY, STATE, ZIP	RALEIGH, NC 27603
CONTACT	RYAN J. RIMMELE, P.E., S.E.
PHONE	(919) 661-6351
EMAIL	CMRP@TEPGROUP.NET

ATTENTION

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

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

May 04, 2015

REV	DATE	ISSUED FOR:
1	05-04-15	REVISED MOD. DRAWINGS
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

TITLE SHEET

SHEET NUMBER: **T-1**

REVISION: 1

TEP #: 25589.31758

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
X	NDE REPORT OF MONOPOLE BASE PLATE PER ENG-SOW-10033
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
NA	CONTINUOUS FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	GROUT COMP. STRENGTH (ASTM C109)
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S 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
X	NON-TENSION CONTROLLED BOLT INSPECTION. SEE SHEET N-4 FOR DETAILS.
ADDITIONAL TESTING AND INSPECTIONS:	
POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

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

MODIFICATION INSPECTION NOTES:

GENERAL

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

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

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 ENG-BUL-10173 LIST OF 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 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 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 IS RESPONSIBLE FOR COLLECTING ALL GENERAL CONTRACTORS (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 ENG-SOW-10007.

RECOMMENDATIONS

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

- IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, 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 FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.

RECOMMENDATIONS (CONTINUED)

- 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 FACILTIES 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 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 EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.

MI VERIFICATION INSPECTIONS

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

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

VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT AEV/AESV FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE OF AN ACCEPTED "PASSING MI" OR "PASS AS NOTED MI" 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/ERECTIONS AND INSPECTION:
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION AND TORQUE
  - FINAL INSTALLED CONDITION
  - SURFACE COATING REPAIR
- POST CONSTRUCTION PHOTOGRAPHS
  - FINAL IN FIELD CONDITION

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

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

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

MI CHECKLIST AND NOTES

SHEET NUMBER: **N-1**

REVISION: **0**

TEP #: 25569.31758

GENERAL NOTES:

1. ALL REFERENCES TO THE OWNER IN THESE DOCUMENTS SHALL BE CONSIDERED CROWN CASTLE OR ITS DESIGNATED REPRESENTATIVE.
2. ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE. THE CONTRACTOR MUST HAVE CONSIDERABLE EXPERIENCE IN 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 AND THAT HE IS PROPERLY LICENSED AND PROPERLY REGISTERED TO DO THIS WORK IN THE STATE OF CONNECTICUT.
3. WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE, 2003 EDITION.
4. UNLESS SHOWN OR NOTED OTHERWISE ON THE CONTRACT DRAWINGS, OR IN THE SPECIFICATIONS, THE FOLLOWING NOTES SHALL APPLY TO THE MATERIALS LISTED HEREIN, AND TO THE PROCEDURES TO BE USED ON THIS PROJECT.
5. ALL HARDWARE ASSEMBLY MANUFACTURER'S INSTRUCTIONS SHALL BE FOLLOWED EXACTLY AND SHALL SUPERSEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.
6. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION AND/OR FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT.
7. ALL DIMENSIONS, ELEVATIONS, AND EXISTING CONDITIONS SHOWN ON THE DRAWINGS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO BEGINNING ANY MATERIALS ORDERING, FABRICATION OR CONSTRUCTION WORK ON THIS PROJECT. CONTRACTOR SHALL NOT SCALE CONTRACT DRAWINGS IN LIEU OF FIELD VERIFICATIONS. ANY DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER AND THE OWNER'S ENGINEER. THE DISCREPANCIES MUST BE RESOLVED BEFORE THE CONTRACTOR IS TO PROCEED WITH THE WORK. THE CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTION OF THE PROTECTIVE MEASURES OR THE PROCEDURES.
8. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK.
10. ACCESS TO THE PROPOSED WORK SITE MAY BE RESTRICTED. THE CONTRACTOR SHALL COORDINATE INTENDED CONSTRUCTION ACTIVITY, INCLUDING WORK SCHEDULE AND MATERIALS ACCESS, WITH THE RESIDENT LEASING AGENT FOR APPROVAL.
11. ALL PERMITS THAT MUST BE OBTAINED ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.
12. IF APPLICABLE, ALL CONCRETE WORK SHALL COMPLY TO LOCAL CODES AND THE ACI 318-02, "BUILDING REQUIREMENTS FOR STRUCTURAL CONCRETE".
13. 24 HOURS PRIOR TO THE BEGINNING OF ANY CONSTRUCTION, THE CONTRACTOR MUST NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY OR CITY) ENGINEER.
14. ALL MATERIALS AND WORKMANSHIP SHALL BE WARRANTED FOR ONE YEAR FROM ACCEPTANCE DATE.
15. ALL TOWER DIMENSIONS SHALL BE VERIFIED WITH THE PLANS (LATEST REVISION) PRIOR TO COMMENCING CONSTRUCTION. NOTIFY THE ENGINEER IMMEDIATELY IF ANY DISCREPANCIES ARE DISCOVERED. THE OWNER SHALL HAVE A SET OF APPROVED PLANS AVAILABLE AT THE SITE AT ALL TIMES WHILE WORK IS BEING PERFORMED. A DESIGNATED RESPONSIBLE EMPLOYEE SHALL BE AVAILABLE FOR CONTACT BY GOVERNING AGENCY INSPECTORS.
16. ALL TOWER MODIFICATION WORK SHALL BE IN ACCORDANCE WITH TIA-1019-A STANDARD FOR INSTALLATION, ALTERATION AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.
17. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE TOWER OWNER OR ENGINEER OF RECORD.

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SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

PROJECT NOTES I

SHEET NUMBER: **N-2**

REVISION: **0**

TEP #: 25589.31.758

STRUCTURAL STEEL NOTES:

1. THE FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AISC SPECIFICATION FOR MANUAL OF STEEL CONSTRUCTION, ALLOWABLE STRESS DESIGN (ASD), 9TH EDITION.
2. UNLESS OTHERWISE NOTED, ALL STRUCTURAL ELEMENTS SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
   STRUCTURAL STEEL:
   - ANGLE: ASTM A36
   - PIPE/TUBE: ASTM A500-50
   - PLATE: ASTM A36 (SELF SUPPORTING AND GUYED TOWERS)
   - PLATE: ASTM A572-65 (MONOPOLE)

   A. ALL BOLTS, ASTM A325 TYPE I GALVANIZED HIGH STRENGTH BOLTS.
   B. ALL U-BOLTS, ASTM A193 GRADE B7
   C. ALL NUTS, ASTM A563 CARBON AND ALLOY STEEL NUTS.
   D. ALL WASHERS, ASTM F436 HARDENED STEEL WASHERS.
3. ALL CONNECTIONS NOT FULLY DETAILED ON THESE PLANS SHALL BE DETAILED BY THE STEEL FABRICATOR IN ACCORDANCE WITH AISC SPECIFICATION FOR MANUAL OF STEEL CONSTRUCTION, ASD, 9TH EDITION.
4. HOLES SHALL NOT BE FLAME CUT THRU STEEL UNLESS APPROVED BY THE ENGINEER.
5. HOT-DIP GALVANIZE ALL ITEMS UNLESS OTHERWISE NOTED, AFTER FABRICATION WHERE PRACTICABLE. GALVANIZING: ASTM A123, ASTM, A153/A153M OR ASTM A653/A653M, G90, AS APPLICABLE. ADDITIONALLY, ALL NEW STEEL SHALL BE PAINTED TO MATCH EXISTING STEEL. CONTRACTOR SHALL OBTAIN WRITTEN PERMISSION TO PROTECT STEEL BY ANY OTHER MEANS.
6. REPAIR DAMAGED SURFACES WITH GALVANIZING REPAIR METHOD AND PAINT CONFORMING TO ASTM A780 OR BY APPLICATION OF STICK OR THICK PASTED MATERIAL SPECIFICALLY DESIGNED FOR REPAIR OF GALVANIZING. CLEAN AREAS TO BE REPAIRED AND REMOVE SLAG FROM WELDS. HEAT SURFACES TO WHICH STICK OR PASTE MATERIAL IS APPLIED, WITH A TORCH TO A TEMPERATURE SUFFICIENT TO MELT THE METALLICS IN STICK OR PASTED; SPREAD MOLTEN MATERIAL UNIFORMLY OVER SURFACES TO BE COATED AND WIPE OFF EXCESS MATERIAL. AFTER REPAIR, STEEL SHALL BE REPAINTED TO MATCH EXISTING FINISH (IF APPLICABLE).
7. A NUT LOCKING DEVICE SHALL BE INSTALLED ON ALL PROPOSED AND/OR REPLACED BOLTS.
8. ALL PROPOSED AND/OR REPLACED BOLTS SHALL BE OF SUFFICIENT LENGTH TO EXCLUDE THE THREADS FROM THE SHEAR PLANE.
9. 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.
10. GALVANIZED ASTM A325 BOLTS SHALL NOT BE REUSED.

WELDING NOTES:

1. ALL WELDING SHALL BE IN ACCORDANCE WITH THE AWS D1.1/D1.1M: 2000 "STRUCTURAL WELDING CODE-STEEL".
2. ALL WELDING SHALL BE PERFORMED BY AWS CERTIFIED WELDERS.
3. CONTRACTOR SHALL RETAIN AN AWS CERTIFIED WELD INSPECTOR TO PERFORM VISUAL INSPECTIONS ON FIELD WELDS. A LETTER AND REPORT SHALL BE ISSUED TO THE CONTRACTOR. CONTRACTOR SHALL SUBMIT LETTER AND REPORT TO TOWER ENGINEERING PROFESSIONALS.
4. GRIND THE SURFACE ADJACENT TO THE WELD FOR A DISTANCE OF 2" MINIMUM ALL AROUND. GRIND THE SURFACE OF THE ROD TO BE INSTALLED FOR A DISTANCE OF 2" MINIMUM ALL AROUND THE AREA TO BE WELDED. ENSURE BOTH AREAS ARE 100% FREE OF ALL GALVANIZING. SURFACES TO BE WELDED SHALL BE FREE FROM SCALE, SLAG, RUST, MOISTURE, GREASE OR ANY OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING.
5. DO NOT WELD IF THE TEMPERATURE OF THE STEEL IN THE VICINITY OF THE WELD AREA IS BELOW 0°F. THE MINIMUM PREHEAT AND INTERPASS TEMPERATURE REQUIREMENTS SHALL COMPLY WITH SECTION 3.5.1 AND TABLE 3.2 OF THE AWS D1.1/D1.1M: 2000.
6. DO NOT WELD ON WET OR FROST-COVERED SURFACES & PROVIDE ADEQUATE PROTECTION FROM HIGH WINDS.
7. FOR ALL WELDING, USE 80 KSI LOW HYDROGEN ELECTRODES. ELECTRODES SHALL BE APPROPRIATE FOR THE WELDING POSITION REQUIRED TO MAKE THE JOINT.
8. AFTER FINAL INSPECTION, THE AREA OF THE WELDS, THE INSTALLATION AND ALL SURFACES DAMAGED BY WELDING OR GRINDING SHALL RECEIVE A COLD-GALVANIZED COATING. THIS COATING SHALL BE APPLIED BY BRUSH. THE GALVANIZING COMPOUND SHALL CONTAIN A MINIMUM OF 95% ± PURE ZINC. THE FINISHED COATING SHALL BE A MINIMUM THICKNESS OF 3 MILS.
9. FOR MONOPOLE TOWERS FULL PENETRATION WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY ULTRASONIC TESTING (UT) IN ACCORDANCE WITH AWS D1.1.
10. FOR MONOPOLE TOWERS PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MAGNETIC PARTICLE (MT) IN ACCORDANCE WITH AWS D1.1.

BOLT TIGHTENING PROCEDURE:

1. TIGHTEN CONNECTION BOLTS BY AISC – "TURN OF THE NUT" METHOD, USING THE CHART BELOW.

BOLT LENGTHS UP TO AND INCLUDING FOUR DIA.

½"	BOLTS UP TO AND INCLUDING 2.0 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
⅝"	BOLTS UP TO AND INCLUDING 2.5 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
¾"	BOLTS UP TO AND INCLUDING 3.0 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
⅞"	BOLTS UP TO AND INCLUDING 3.5 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
1"	BOLTS UP TO AND INCLUDING 4.0 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT

BOLT LENGTHS OVER FOUR DIA. BUT NOT EXCEEDING EIGHT DIA.

½"	BOLTS 2.25 TO 4.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
⅝"	BOLTS 2.75 TO 5.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
¾"	BOLTS 3.25 TO 6.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
⅞"	BOLTS 3.75 TO 7.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
1"	BOLTS 4.25 TO 8.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT

2. CONNECTION BOLTS SUBJECT TO DIRECT TENSION SHALL BE INSTALLED AND TIGHTENED AS PER SECTION 8.2.1 OF THE AISC SPECIFICATION FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS, LOCATED IN THE AISC MANUAL OF STEEL CONSTRUCTION. THE INSTALLATION PROCEDURE IS PARAPHRASED AS FOLLOWS:
3. FASTENERS SHALL BE INSTALLED IN PROPERLY ALIGNED HOLES AND TIGHTENED BY ONE OF THE METHODS DESCRIBED IN SUBSECTION 8.2.1 THROUGH 8.2.4.

8.2.1 TURN-OF-THE-NUT TIGHTENING

BOLTS SHALL BE INSTALLED IN ALL HOLES OF THE CONNECTION AND BROUGHT TO A SNUG TIGHT CONDITION AS DEFINED IN SECTION 8.1, UNTIL ALL THE BOLTS ARE SIMULTANEOUSLY SNUG TIGHT AND THE CONNECTION IS FULLY COMPACTED. FOLLOWING THIS INITIAL OPERATION ALL BOLTS IN THE CONNECTION SHALL BE TIGHTENED FURTHER BY THE APPLICABLE AMOUNT OF ROTATION SPECIFIED ABOVE. DURING THE TIGHTENING OPERATION THERE SHALL BE NO ROTATION OF THE PART NOT TURNED BY THE WRENCH. TIGHTENING SHALL PROGRESS SYSTEMATICALLY FROM THE MOST RIGID PART OF THE JOINT IN A MANNER THAT WILL MINIMIZE RELAXATION OF PREVIOUSLY PRETENSIONED BOLTS.

4. ALL OTHER BOLTED CONNECTIONS SHALL BE BROUGHT TO A SNUG TIGHT CONDITION AS DEFINED IN SECTION 8.1 OF THE SPECIFICATION.

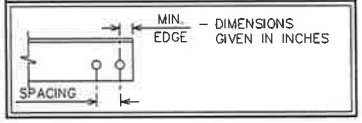
NOMINAL HOLE DIMENSIONS

BOLT DIAMETER	STANDARD HOLE	SHORT SLOT
½	9/16	9/16 X 1 1/16
⅝	11/16	11/16 X 7/8
¾	13/16	13/16 X 1
⅞	15/16	15/16 X 1 1/8
1	1 1/16	1 1/16 X 1 5/16

– DIMENSIONS GIVEN IN INCHES

BOLT EDGE AND SPACING

BOLT DIAMETER	MIN. EDGE	SPACING
½	⅞	1½
⅝	1⅛	1⅞
¾	1¼	2¼
⅞	1½	2⅝
1	1¾	3



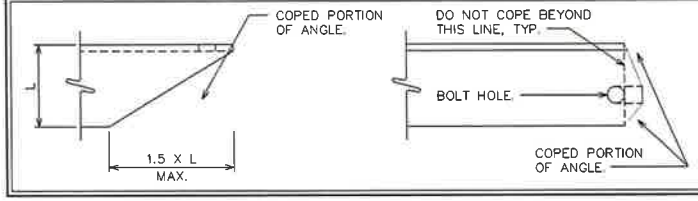
– DIMENSIONS GIVEN IN INCHES

WORKABLE GAGES

LEG	4	3½	3	2½	2	1¾
G	2	1¾	1½	1¼	1	⅞

– WORKABLE GAGES GIVEN IN INCHES
– MATCH EXISTING WHEN APPLICABLE

ALLOWABLE ANGLE COPE



PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

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SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

PROJECT NOTES II

SHEET NUMBER: **N-3**

REVISION: **0**

TEP #: 25589.31758

BOLTS AND COMPONENTS SPECIFICATIONS:

BOLT:
AJAX M20 "ONE SIDE" BLIND BOLT

SHEAR SLEEVE:
Fu = 120 KSI (MINIMUM)
29mm O.D. X 20 mm I.D.
LENGTH = NOMINAL [GRIP-6mm] = [GRIP - 0.25"] (TOLERANCE: -0", +1/32")
SLEEVE SHALL BE ROUND, WITH ENDS CUT SQUARE AND DEBURRED.

SPECIAL WASHER:
ASTM F959 SQUIRTER® DTI M20 (EQUIVALENT TO A325 BOLT)
MANUFACTURER:
APPLIED BOLTING TECHNOLOGY PRODUCTS, INC.
1413 ROCKINGHAM ROAD BELLOW FALLS, VERMONT, USA 05101
PHONE: (800) 552-1999
WEBSITE: WWW.APPLIEDBOLTING.COM

DISTRIBUTORS OF SQUIRTER® DTI'S:
HTTP://WWW.APPLIEDBOLTING.COM/APPLIED-BOLTING-DISTRIBUTORS.HTML

WASHER:
ASTM F436 HARDENED FLAT WASHER M20

BOLT ASSEMBLY FINISHING:
SHEAR SLEEVE: COLD GALVANIZED AS PER CROWN ENG-BUL-10149 OR CADMIUM PLATED
ALL OTHER PARTS: HOT DIP GALVANIZED

BOLT INSTALLATION ASSEMBLY:
AS SHOWN ON THE DRAWING

INSTALLATION NOTES:
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.

TIGHTEN THE BOLT ASSEMBLY UNTIL THE ORANGE SILICONE APPEARS FROM UNDER THE DTI'S SQUIRT LOCATIONS, THEN STOP TIGHTENING.

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

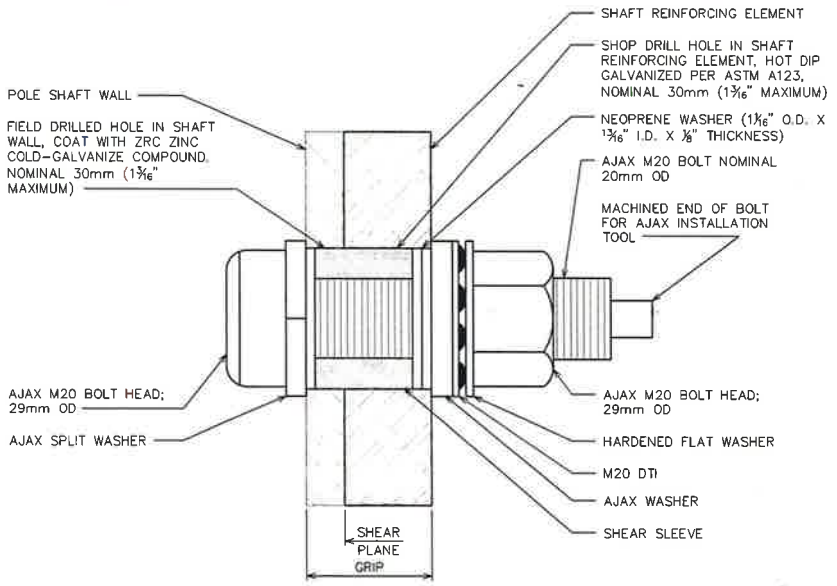
AS AN ALTERNATIVE TO USING THE DTI WASHER THE BOLTS MAY BE PRETENSIONED USING THE TURN-OF-NUT METHOD AS SPECIFIED IN SECTION 8.2.1 TURN-OF-NUT PRETENSIONING OF THE RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS. ALL FASTENERS SHALL BE INSPECTED PER SECTION 9.2.1 OF THE RCSC SPECIFICATION. THE BOLTS SHALL BE MATCH MARKED WITH A PERMANENT MARKER TO FACILITATE THE INSPECTION.

INSPECTION:
ALL AJAX BOLTS WITH DTI'S SHALL BE VISUALLY INSPECTED ACCORDING TO THE DTI MANUFACTUER'S INSTRUCTIONS BOLT INSPECTOR SHALL PROVIDE PHOTO DOCUMENTATION OF BOLTS AFTER TIGHTENING CLEARLY SHOWING THE CONDITION OF THE DTI'S.

INSPECTION PROCEDURES:
- REVIEW MODIFICATION DESIGN DRAWINGS.
- ENSURE AISC PRE-TENSION REQUIREMENTS ARE INCLUDED.
- PHOTO (PREFERABLY VIDEO) OF THE FOLLOWING:
  - NOTE THE PRESENCE OF ANY LUBRICANT
  - NOTE THE PRESENCE OF ANY NUT/BOLT MARKINGS USED TO APPLY THE AISC "TURN OF THE NUT" METHOD PRIOR TO APPLYING NEW MARKINGS
  - BE SURE THAT ANY NEW MARKINGS MADE BY THE MI INSPECTOR ARE DISTINGUISHABLE (DIFFERENT COLOR) TO ANY ORIGINAL MARKINGS
  - MARK THE BOLT AND NUT WITH MARKER TO DOCUMENT POSITION UPON ARRIVAL. RUN THE MARK ONTO THE POLE AS WELL.
  - USE YOUR HAND TO FIRST ASSURE THE NUT IS TIGHT, TRYING TO TURN THE NUT IN ANY DIRECTION.
  - BOLT TYPES:
  - FOR AJAX, USING AJAX TOOL TO HOLD THE BOLT AND A SPUD WRENCH (OR SIMILAR) ON THE NUT. APPLY FIRM FORCE TO THE NUT IN THE CLOCKWISE DIRECTION (THIS IS NOT THE FULL EFFORT OF THE PERSON).
  - FOR OTHER STRUCTURAL BOLTS, ENSURE THE BOLT CAN BE HELD WHILECHECKING THE TIGHTNESS OF THE ASSEMBLY.
  - DOCUMENT BOLTS TESTED AND RESULTS, USE THE NUMBER CONVENTION BELOW AND WRITE ON THE POLE AND PHOTOGRAPH:
  - A THREE DIGIT CONVENTION SHALL BE USED (1, 3, 15)
  - THE FIRST DIGIT - THE FLAT NUMBER. ON ROUND POLES, THIS FIRST DIGIT SHALL BE REPLACED WITH THE HEADING (N, NE, E, SE, S, SW, W, N, NW)
  - THE SECOND DIGIT - THE NUMBER OF REINFORCING BARS ON THAT FLAT, STARTING WITH THE LOWEST BAR AS 1
  - THE THIRD DIGIT - THE NUMBER OF BOLTS ON THAT BAR STARTING WITH THE LOWEST BOLT AS 1
  - FLATS AND ROUND POLES ARE TO BE LABELED IN ACCORDANCE WITH THE MONOPOLE FLAT NUMBER PROCEDURE

INTERIOR OF POLE SHAFT

EXTERIOR OF POLE SHAFT



AJAX BOLT DETAILS

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
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OFFICE: (980) 209-8253

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SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

AJAX BOLT INSTALLATION DETAILS

SHEET NUMBER: **N-4**

REVISION: **0**

TEP #: 25589.31758

NOTES:

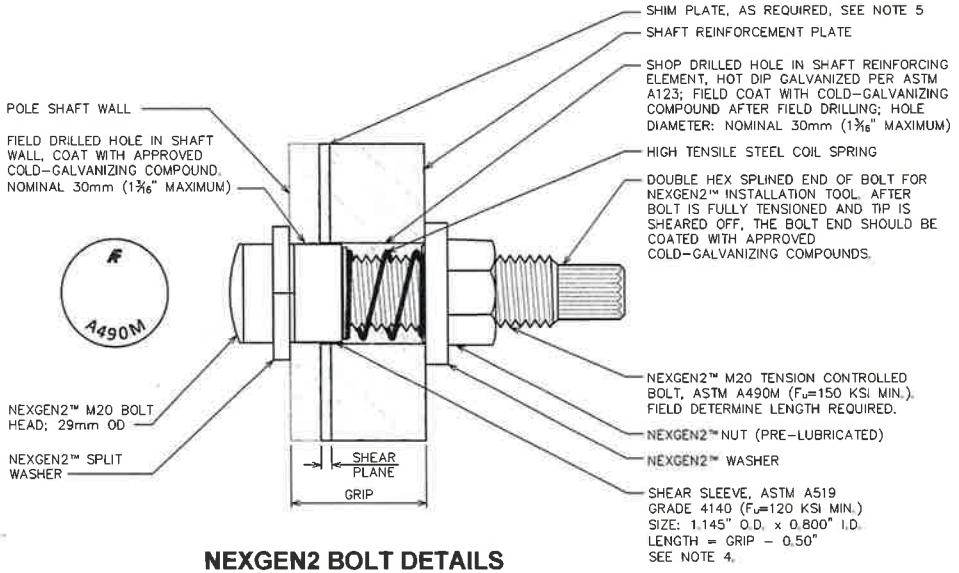
1. ALL SHOP AND FIELD DRILLED HOLES SHALL BE NOMINAL 30mm DIAMETER. THE MAXIMUM HOLE DIAMETER PERMITTED IS 1-3/16".
2. THE NEXTGEN2™ SHALL BE MAGNI 363 COATED PER ASTM F2833 AS APPROPRIATE.
3. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
4. SHEAR SLEEVE MUST EXTEND BEYOND THE SHEAR PLANE.
5. SHIMS FOR MONOPOLE 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. ADJACENT SHIM PLATE THICKNESSES MAY TAPER IN INCREMENTS OF 1/16" AND SHALL BE NO LESS THAN 1/16". STACKING OF SHIMS IS PERMITTED. SHIMS GREATER THAN 1/4" IN THICKNESS LOCATED WITHIN THE TERMINATION LENGTH OF THE SHAFT REINFORCEMENT PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.

INSPECTION NOTES AND PROCEDURES:

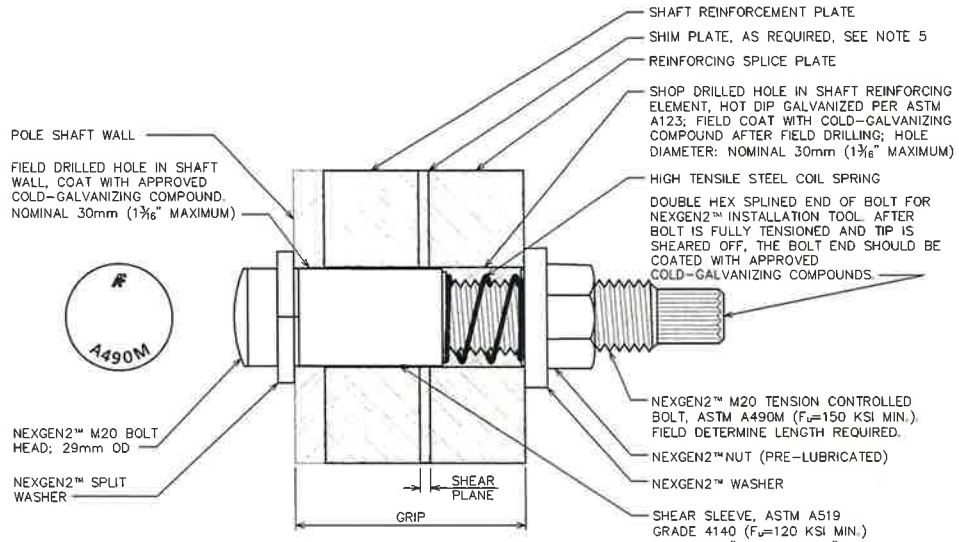
1. REVIEW STRUCTURAL DESIGN DRAWINGS.
2. VISUALLY INSPECT SHEARED BOLT ENDS TO ENSURE CORRECT TENSION WAS ACHEIVED.
3. VERIFY BOLT ENDS ARE SUFFICIENTLY COATED WITH APPROVED COLD-GALVANIZING COMPOUNDS.

INTERIOR OF POLE SHAFT

EXTERIOR OF POLE SHAFT



NEXGEN2 BOLT DETAILS



NEXGEN2 BOLT DETAILS

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

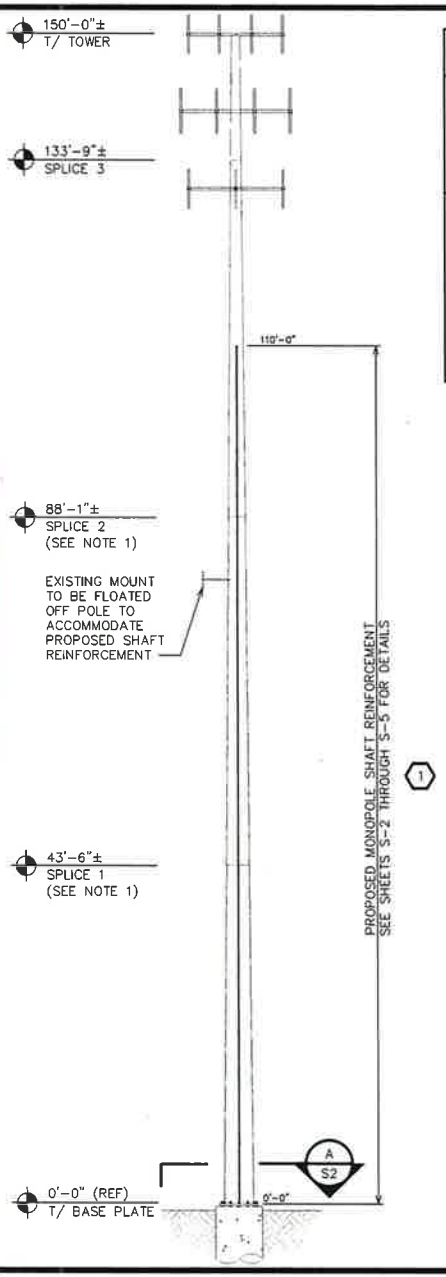
SHEET TITLE:

NEXGEN2 INSTALLATION DETAILS

SHEET NUMBER: **N-5**

REVISION: **0**

TEP #: 25589.31758



POLE SPECIFICATIONS

POLE SHAPE TYPE:	18-SIDED POLYGON
POLE SHAFT GRADE:	ASTM A572-65
BASE PLATE GRADE:	ASTM A871-60
ANCHOR BOLT GRADE:	ASTM A615-75

SHAFT SECTION	SECTION LENGTH (FT.)	SHAFT THICKNESS (IN.)	LAP SPLICE (FT.)	OUTER DIAMETER (IN.)	
				TOP	BOTTOM
1	16.29	0.188	2.58	13.000	16.650
2	48.21	0.313	3.83	15.696	26.380
3	48.42	0.375	5.00	24.905	35.620
4	48.50	0.375	-	33.764	44.500

MODIFICATION SCHEDULE

NO.	MODIFICATION DESCRIPTION	ELEVATION (FT.)
1	INSTALL PROPOSED MONOPOLE SHAFT REINFORCEMENT. SEE SHEETS S-2 THROUGH S-5 FOR DETAILS.	0 - 110
2	CROWN CASTLE WILL CONTRACT WITH A THIRD PARTY VENDOR TO PERFORM THE MODIFICATION INSPECTION. THE CONTRACTOR SHALL COORDINATE THE INSPECTION WITH THE MODIFICATION INSPECTOR AND CROWN CASTLE PROJECT MANAGER. SEE SHEET N-1 FOR DETAILS.	-

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY SPLICE ELEVATION PRIOR TO INSTALLATION. CONTACT TOWER OWNER AND ENGINEER OF RECORD IF SPLICE ELEVATIONS DIFFER FROM WHAT IS SHOWN. SHAFT REINFORCEMENT ELEVATIONS ARE DEPENDANT ON SPLICE ELEVATIONS AND MAY NEED TO BE ADJUSTED TO ACCOMMODATE ACTUAL SPLICE ELEVATION.
2. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO PROVIDE THE MODIFICATION INSPECTOR/ ENGINEER OF RECORD WITH A SEALED CERTIFIED WELD INSPECTION REPORT. THIS REPORT SHALL DOCUMENT THE ENTIRE WELDING PROCESS (PRE/DURING/POST) WITH PROPER PHOTOS. WELDING SHALL CONFORM TO AWS D1.1/D1.1M: 2000 "STRUCTURAL WELDING CODE-STEEL", FOR ADDITIONAL NOTES, SEE WELDING NOTES.
3. ANTENNAS AND OTHER APPURTENANCES MAY NEED TO BE TEMPORARILY REMOVED OR MOVED DURING THE INSTALLATION OF THE MODIFICATIONS SHOWN ABOVE.
4. NDE OF THE CIRCUMFERENTIAL WELD OF THE BASE PLATE TO SHAFT CONNECTION IS REQUIRED. PLEASE SEE ENG-SOW-10033 : TOWER BASE PLATE NDE AND ENG-BUL-10051 : NDE REQUIREMENTS FOR MONOPOLE BASEPLATE TO PREVENT CONNECTION FAILURE. NOTIFY THE EOR AND CROWN ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING MODIFICATIONS THAT HAVE BEEN WELDED TO THE BASE PLATE. FULL PENETRATION WELDING TO THE BASEPLATE REQUIRED AS PART OF THIS ACTIVE REINFORCEMENT DESIGN SHALL BE INCLUDED IN THE NDE SCOPE OF WORK.
5. PRIOR TO INSTALLATION OF THE REINFORCEMENT PLATES, THE CONTRACTOR SHALL ENSURE THE JOINT OVERLAP HAS BEEN PROPERLY ACHIEVED AT ALL SPLICE JOINTS, PER THE TOWER MANUFACTURER DRAWINGS. IF NOT ACHIEVED, JACKING OF THE TOWER WILL BE REQUIRED. CONTRACTOR SHALL REFERENCE TOWER MANUFACTURER'S INSTALLATION GUIDELINES FOR PREFERRED METHOD FOR JACKING MONOPOLE TUBE SECTION TOGETHER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS IN CONNECTION WITH THIS WORK.
6. DUE TO THE MODIFICATIONS REQUIRED, CONTINUOUS INSPECTIONS AND MATERIAL TESTING WILL NEED TO BE PERFORMED.
7. CONTRACTOR SHALL ORDER AND INSTALL A NEW TOWER TAG IF THE EXISTING TOWER TAG IS MOVED OR DAMAGED DUE TO THE INSTALLATION OF THE MODIFICATION SHOWN ABOVE.
8. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE TOWER OWNER OR ENGINEER OF RECORD.

ATTENTION

NO DETAILED INFORMATION REGARDING INTERFERENCES WAS PROVIDED. THEREFORE, CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSION BEFORE FABRICATING MATERIALS AND PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO TOWER ENGINEERING PROFESSIONALS, INC., AND CROWN CASTLE CONSTRUCTION MANAGER IMMEDIATELY.

0 16 32
SCALE IN FEET

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ CHECKED BY: GJS

SHEET TITLE:

TOWER ELEVATION AND MODIFICATION SCHEDULE

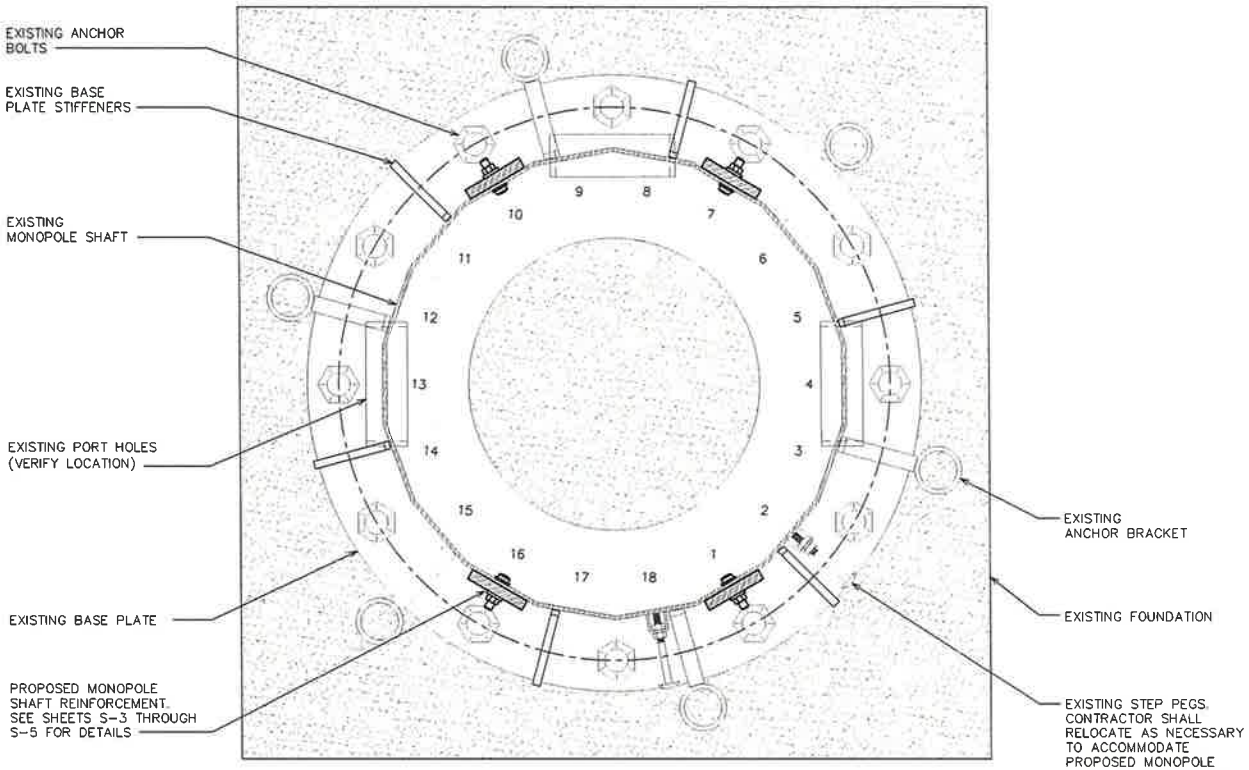
SHEET NUMBER: **S-1**

REVISION: **0**

TEP #: 25569.31758

ATTENTION

THE TOWER SAFETY CLIMB WAS ASSUMED TO BE LOCATED OFF FLAT 1. FIELD VERIFY SAFETY CLIMB AND STEP PEG LOCATION PRIOR TO INSTALLATION. CONTACT TOWER OWNER AND ENGINEER OF RECORD SHOULD ANY DISCREPANCIES ARISE. CONTRACTOR TO REMOVE AND RE-ATTACH SAFETY CLIMB AND STEP PEGS AS NECESSARY TO INSTALL PROPOSED REINFORCEMENT. IF STEP PEGS ARE REQUIRED TO BE ATTACHED TO PROPOSED REINFORCEMENT, IT SHALL BE DONE PRIOR TO GALVANIZATION.



SECTION (A)
SCALE: 1" = 1'-0"

0 1 2
SCALE IN FEET

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

STATE OF CONNECTICUT
GREGORY J. MORES
25536
LICENSED
PROFESSIONAL ENGINEER

May 04, 2015

REV	DATE	ISSUED FOR:
1	05-04-15	REVISED MOD. DRAWINGS
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

BASE SECTION DETAILS

SHEET NUMBER: **S-2**

REVISION: 1

TEP #: 25569.31758

CROWN CASTLE 65KSI FLAT PLATE REINFORCEMENT SCHEDULE

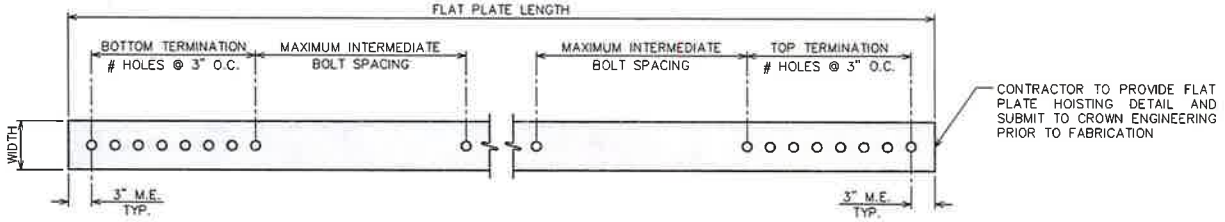
PART NUMBER	FLATS / ANGLES	BOTTOM ELEVATION (FT)	TOP ELEVATION (FT)	FLAT PLATE LENGTH (FT)	FLAT PLATE QUANTITY	TERMINATION BOLTS		MAXIMUM INTERMEDIATE BOLT SPACING (IN)	TOTAL BOLT QUANTITY	TOTAL STEEL WEIGHT (LB)	TERMINATION DETAIL	
						(BOT.)	(TOP)				(BOT.)	(TOP)
CCI-WSFP-06010035	10 16	0.00	35.00	35.00	2	-	8	16.00	64	1429.2	1	5
CCI-WSFP-06010030	1 7	0.00	30.00	30.00	2	-	8	16.00	56	1225.0	1	4
CCI-SFP-06010035	13	30.00	65.00	35.00	1	8	8	16.00	39	714.6	5	4
CCI-SFP-06010035	1 7	30.00	65.00	35.00	2	8	8	16.00	78	1429.2	4	4
CCI-SFP-06010020	1 7 13	65.00	85.00	20.00	3	8	8	16.00	81	1225.0	4	4
CCI-SFP-06010025	1 7 13	85.00	110.00	25.00	3	8	8	16.00	93	1531.3	4	3A
								TOTALS:	411	7554.2		

NOTES:

1. REFER TO SHEETS N-4 AND N-5 FOR BOLT INSTALLATION DETAILS.
2. SEE SHEETS S-4 AND S-5 FOR TERMINATION DETAILS.
3. ELEVATIONS ARE NOMINAL. REFERENCE STANDARD DETAILS FOR VARIATIONS IN TOP AND BOTTOM ELEVATIONS
4. 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. ADJACENT SHIMS PLATE THICKNESSES MAY TAPER IN INCREMENTS OF $\frac{1}{16}$" AND SHALL BE NO LESS THAN $\frac{1}{16}$". STACKING OF SHIMS IS PERMITTED. SHIMS GREATER THAN $\frac{1}{2}$" IN THICKNESS LOCATED WITHIN THE TERMINATION LENGTH OF THE SHAFT REINFORCEMENT PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.
5. FASTENER WEIGHT, SHIM PLATE WEIGHT, AND REINFORCING SPLICE PLATE WEIGHT NOT TABULATED IN THE TOTAL STEEL WEIGHTS.
6. ALL MATERIAL QUANTITIES ARE APPROXIMATE AND SHALL BE FIELD VERIFIED

CCI PART NUMBER FORMAT: CCI-|XXX|-|XXX|XXX|XX|
(SEE CHART, WIDTH, THICKNESS, LENGTH)

FLAT PLATE STANDARD NOMENCLATURE		NOTES
CCI-SFP	STANDARD FLAT PLATE	SEE CMRP 65 KSI PARTS CATALOG - 2ND EDITION AND THIS SHEET FOR DETAILS
CCI-WSFP	WELDABLE STANDARD FLAT PLATE	
CCI-AFP	AUXILIARY FLAT PLATE	
CCI-WAFP	WELDABLE AUXILIARY FLAT PLATE	
CCI-CFP	CUSTOM FLAT PLATE	SEE THIS SHEET FOR DETAILS
CCI-WCFP	WELDABLE CUSTOM FLAT PLATE	



TYPICAL FLAT PLATE REINFORCEMENT DETAIL

SCALE: N.T.S.

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

May 01, 2015

REV	DATE	ISSUED FOR:
1	05-04-15	REVISED MOD. DRAWINGS
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

SHAFT REINFORCEMENT DETAILS

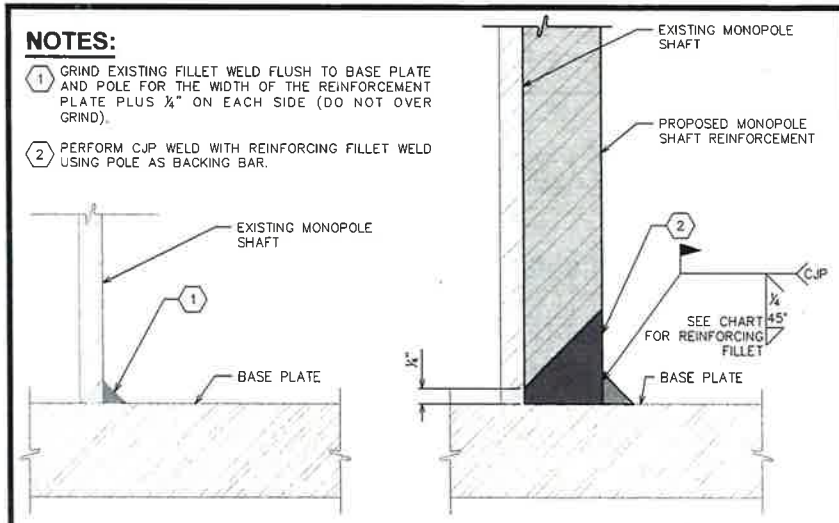
SHEET NUMBER: **S-3**

REVISION: 1

TEP #: 25589.31758

NOTES:

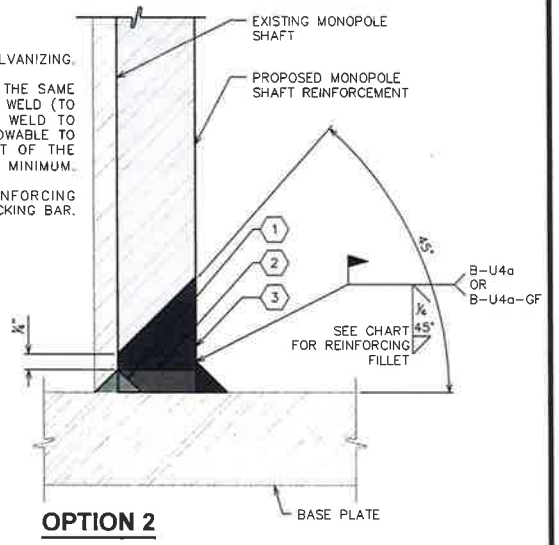
1. GRIND EXISTING FILLET WELD FLUSH TO BASE PLATE AND POLE FOR THE WIDTH OF THE REINFORCEMENT PLATE PLUS ¼" ON EACH SIDE (DO NOT OVER GRIND).
2. PERFORM CJP WELD WITH REINFORCING FILLET WELD USING POLE AS BACKING BAR.



OPTION 1

NOTES:

1. CLEAN EXISTING WELD FROM GALVANIZING.
2. BUILD PLATFORM WITH WELD AT THE SAME HEIGHT OF THE EXISTING FILLET WELD (TO REDUCE THE AMOUNT OF THE WELD TO BUILD THE PLATFORM, IT IS ALLOWABLE TO PARTIALLY GRIND THE HEIGHT OF THE EXISTING FILET WELD TO A ¼" MINIMUM.
3. PERFORM CJP WELD WITH REINFORCING FILLET WELD USING POLE AS BACKING BAR.



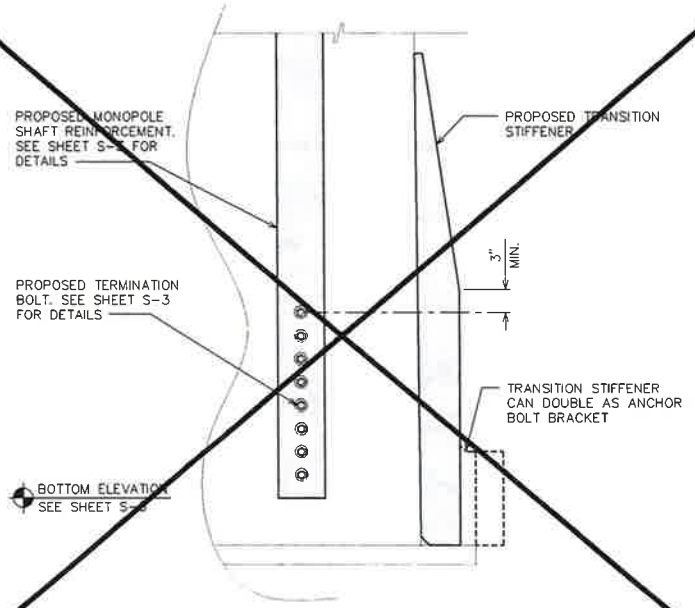
OPTION 2

BASE WELD TERMINATION DETAILS (1)

SCALE: N.T.S.

REINFORCING FILLET SIZE

PART NUMBER	PLATE SIZE	MINIMUM REINFORCING WELD
CCI-WSFP-040075 CCI-WAFP-040075 CCI-WCFP-040075	¾" x 4"	¼"
CCI-WSFP-045100 CCI-WAFP-045100 CCI-WCFP-045100	1" x 4½"	¼"
CCI-WSFP-060100 CCI-WAFP-060100 CCI-WCFP-060100	1" X 6"	⅜"
CCI-WSFP-065125 CCI-WAFP-065125 CCI-WCFP-065125	1¼" x 6½"	½"
CCI-WSFP-085125 CCI-WAFP-085125 CCI-WCFP-085125	1¼" X 8½"	⅝"



TRANSITION STIFFENER TERMINATION DETAILS (2)

SCALE: N.T.S.

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
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PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

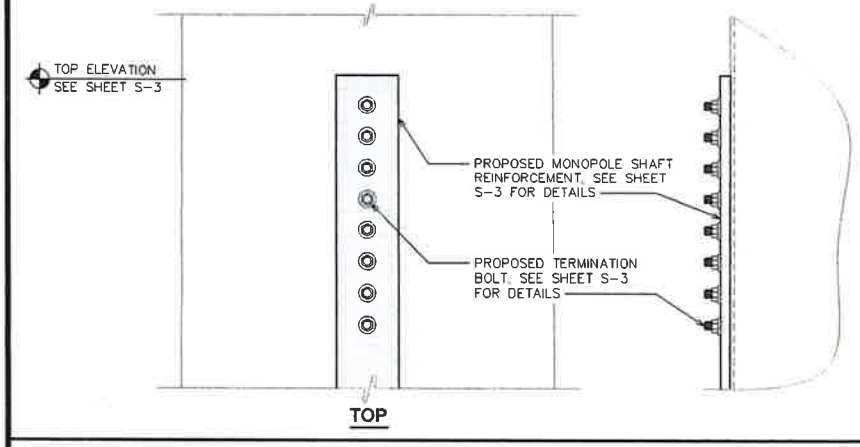
SHEET TITLE:

TYP. SHAFT REINFORCEMENT DETAILS I

SHEET NUMBER: **S-4**

REVISION: 0

TEP #: 25589.31758

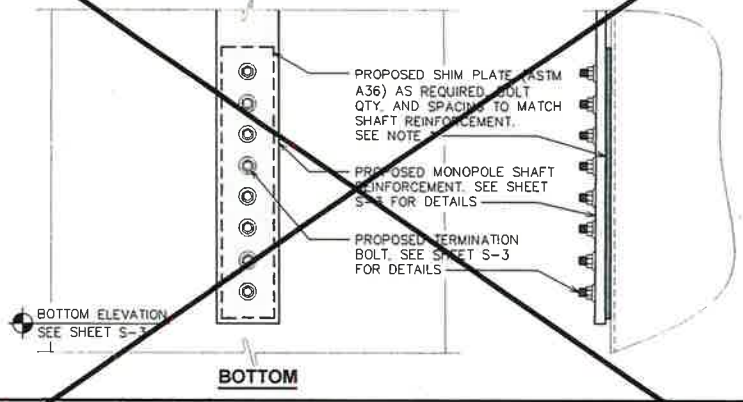


TOP TERMINATION DETAILS (3A)

SCALE: N.T.S.

NOTE:

1. SHIMS GREATER THAN ¼" IN THICKNESS LOCATED WITHIN THE TERMINATION LENGTH OF THE SHAFT REINFORCEMENT PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.

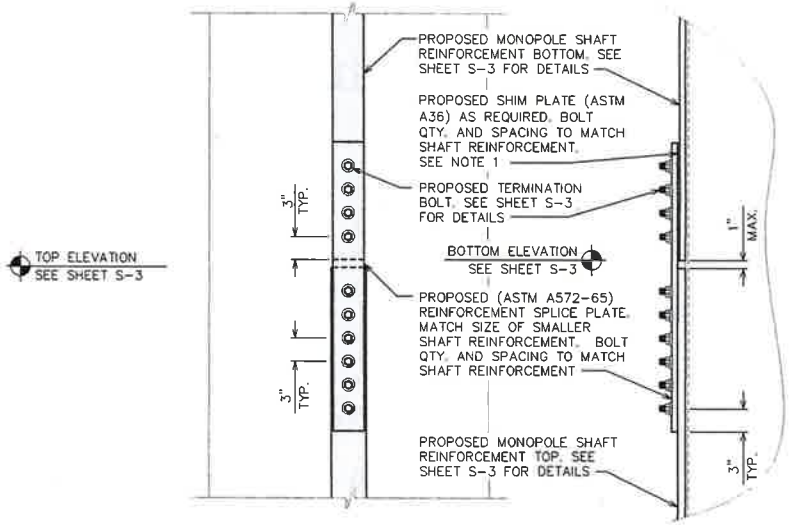


BOTTOM TERMINATION DETAILS (3B)

SCALE: N.T.S.

NOTE:

1. SHIMS GREATER THAN ¼" IN THICKNESS LOCATED BETWEEN THE SHAFT REINFORCEMENT PLATE AND THE REINFORCEMENT SPLICE PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.

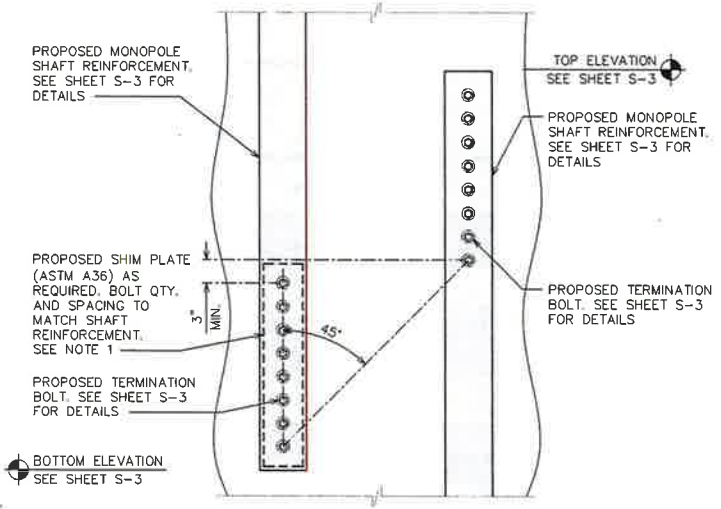


REINFORCEMENT SPLICE DETAILS (4)

SCALE: N.T.S.

NOTE:

1. SHIMS GREATER THAN ¼" IN THICKNESS LOCATED WITHIN THE TERMINATION LENGTH OF THE SHAFT REINFORCEMENT PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.



OVERLAP SPLICE DETAILS (5)

SCALE: N.T.S.

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
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PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

TYP. SHAFT REINFORCEMENT DETAILS II

SHEET NUMBER: **S-5**

REVISION: **0**

TEP #: 25589.31756

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 150-ft monopole tower designed by Engineering Endeavors, Inc. in July of 2000. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F for the appurtenances listed in Table 3. The tower has been modified per reinforcement drawings prepared by Tower Engineering Professionals in December of 2007. All information provided to TEP was assumed to be accurate and complete.

2) ANALYSIS CRITERIA

The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and ASCE 7-05 Minimum Design Loads for Buildings and Other Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch escalating 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
140.0	140.0	3	Alcatel Lucent	RRH2X60-AWS	1	1-5/8	1
		3	Alcatel Lucent	RRH2X60-PCS			
		6	Commscope	HBXX-6517DS-A2M w/ Mount Pipe			
		1	Commscope	LNX-6514DS-VTM w/ Mount Pipe			
		2	Commscope	LNX-8513DS-VTM w/ Mount Pipe			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			

Notes:
1) See "Appendix B – Base Level Drawing" for assumed feed line configuration.

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
150.0	152.0	6	Decibel	DB980H90E-M w/ Mount Pipe	6	1-5/8	1
	150.0	1	Tower Mounts	Platform Mount [LP 712-1]			
140.0	140.0	2	Antel	BXA-185063/12CF w/ Mount Pipe	-	-	2
		1	Antel	BXA-185085/12CF w/ Mount Pipe			
		3	Antel	BXA-70063/6CF w/ Mount Pipe			
		3	Decibel	DB844H65E-XY w/ Mount Pipe			
		3	Antel	BXA-70063/6CF w/ Mount Pipe	18	1-5/8	1
		1	Tower Mounts	Platform Mount [LP 304-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
130.0	130.0	1	Andrew	DBXNH-6565B-R2M w/ Mount Pipe	1 2 12	3/8 7/16 1-5/8	1
		3	Ericsson	RRUS 11			
		1	KMW Communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	Powerwave Technologies	7770.00 w/ Mount Pipe			
		6	Powerwave Technologies	LGP21401			
		6	Powerwave Technologies	LGP21901			
		1	Powerwave Technologies	P65-16-XLH-RR w/ Mount Pipe			
		1	Raycap	DC6-48-60-18-8F			
		1	Tower Mounts	Side Arm Mount [SO 701-3]			
		1	Tower Mounts	Platform Mount [LP 304-1]			
80.0	81.0	1	Lucent	KS24019-L112A	1	1/2	1
	80.0	1	Tower Mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing equipment
2) Existing 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)
150.0	150.0	12	DAPA	458000	-	-
140.0	140.0	12	DAPA	458000	-	-
130.0	130.0	12	DAPA	458000	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Reports	Dr. Clarence Welti, P.E., P.C.	1615342	CCISites
Tower Foundation Drawings	Engineering Endeavors, Inc.	1615435	CCISites
Tower Manufacturer Drawings	Engineering Endeavors, Inc.	1615370	CCISites
Tower Reinforcement Drawings	Tower Engineering Professionals, Inc.	2154747	CCISites
Previous Structural Analysis Report	Tower Engineering Professionals, Inc.	5616550	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.

For analysis of monopole shaft reinforcements, the plates are modeled as linear appurtenances along the exterior of the pole. The loads calculated from tnxTower are then exported to a proprietary calculation sheet created by Tower Engineering Professionals, Inc. that analyzes each reinforcing element along each critical axis and presents percent capacities for each element and the pole shaft along each critical axis. The actual percent capacity of the tower structure including the reinforcing elements is reported in Table 5 - Section Capacity (Summary).

3.2) Assumptions

1) The tower and foundation were built in accordance with the manufacturer's specifications.
2) The tower and foundation 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 "Appendix B – Base Level Drawing".
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by the standard.
5) All tower components are in sufficient condition to carry their full design capacity.
6) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
7) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not perform a site visit to verify the size, condition or capacity of the antenna mounts and did not analyze antennas supporting mounts as part of this structural analysis report.
8) Per recent photos, the TME's listed below are shown to be installed directly behind the existing antennas and oriented such that they are completely shielded from the front, but not the sides:
   a) (6) Powerwave Technologies LGP21401 at 130-ft mount level
   b) (6) Powerwave Technologies LGP21901 at 130-ft mount level

This analysis may be affected if any assumptions are not valid or have been made in error. Tower Engineering Professionals 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	150.00-133.71	Pole	TP16.65×13.00×0.1875	1	Note 1	Note 1	43.0	Pass
L2	136.29-88.08	Pole	TP26.38×15.70×0.3125	2	Note 1	Note 1	93.9	Pass
L3	91.92-43.50	Pole	TP35.62×24.91×0.3750	3	Note 1	Note 1	71.4	Pass
L4	48.50-0.00	Pole	TP44.50×33.76×0.3750	4	Note 1	Note 1	85.2	Pass
M1	35.00-0.00	Mod (Pr)	CCI-WSFP-060100	1	Note 1	Note 1	86.8	Pass
M2	30.00-0.00	Mod (Pr)	CCI-WSFP-060100	2	Note 1	Note 1	86.8	Pass
M3b	65.00-30.00	Mod (Pr)	CCI-SFP-060100	3	Note 1	Note 1	95.3	Pass
M4	85.00-65.00	Mod (Pr)	CCI-SFP-060100	4	Note 1	Note 1	85.6	Pass
M5	110.00-85.00	Mod (Pr)	CCI-SFP-045100	5	Note 1	Note 1	94.8	Pass
							Summary	
						Pole (L2)	93.9	Pass
						Mod (M3b)	95.3	Pass
						RATING =	**95.3**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	-	99.8	Pass
1	Base Plate	-	98.9	Pass
1	Base Foundation Soil Interaction	-	53.4	Pass
1	Base Foundation Structural	-	45.1	Pass

Structure Rating (max from all components) =	99.8%

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

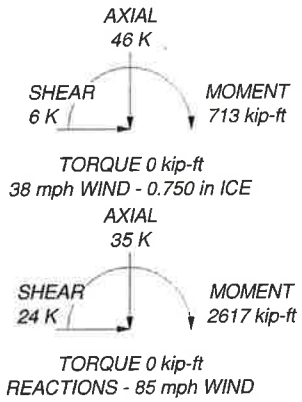
4.1) Recommendations

1) If the load differs from that described in Tables 1 and 2 of this report, "Appendix B – Base Level Drawing" or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
2) The modifications depicted in "Appendix D – Structural Design Drawings" shall be installed and, upon completion, inspected. The tower and its foundation have sufficient capacity to carry the existing and proposed loads once the proposed modifications are installed.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5	6	7	8	9	10
Length (ft)	16.29	27.79	20.42	8.92	20.00	19.50	15.50	4.00	1.00	28.00
Number of Sides	18	18	18	18	18	18	18	18	18	18
Thickness (in)	0.188	0.313	0.511	0.564	0.587	0.564	0.548	0.486	0.597	0.470
Socket Length (ft)	2.58		3.83			5.00				
Top Dia (in)	13.000	15.696	21.855	24.905	26.879	31.304	33.764	37.436	37.194	38.301
Bot Dia (in)	16.650	21.855	26.380	26.879	31.304	35.620	37.194	38.337	37.416	44.500
Grade	0.5	1.7	1.6	0.9	2.3	2.6	2.2	0.6	0.1	4.7
Weight (K)										17.3



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB980H90E-M w/ Mount Pipe	150	(2) 7770.00 w/ Mount Pipe	130
(2) DB980H90E-M w/ Mount Pipe	150	(2) 7770.00 w/ Mount Pipe	130
(2) DB980H90E-M w/ Mount Pipe	150	(2) 7770.00 w/ Mount Pipe	130
2.4" Dia. x 6' Mount Pipe	150	(2) LGP21401	130
2.4" Dia. x 6' Mount Pipe	150	(2) LGP21401	130
2.4" Dia. x 6' Mount Pipe	150	(2) LGP21401	130
Platform Mount [LP 712-1]	150	(2) LGP21901	130
(2) HBXX-6517DS-A2M w/ Mount Pipe	140	(2) LGP21901	130
(2) HBXX-6517DS-A2M w/ Mount Pipe	140	(2) LGP21901	130
(2) HBXX-6517DS-A2M w/ Mount Pipe	140	RRUS 11	130
RRH2X60-PCS	140	RRUS 11	130
RRH2X60-PCS	140	RRUS 11	130
RRH2X60-PCS	140	DBXNH-6565B-R2M w/ Mount Pipe	130
RRH2X60-AWS	140	P65-16-XLH-RR w/ Mount Pipe	130
RRH2X60-AWS	140	AM-X-CD-16-65-00T-RET w/ Mount Pipe	130
RRH2X60-AWS	140		
DB-T1-6Z-8AB-0Z	140	DC6-48-60-18-8F	130
LNX-8513DS-VTM w/ Mount Pipe	140	Platform Mount [LP 304-1]	130
LNX-6514DS-VTM w/ Mount Pipe	140	Side Arm Mount [SO 701-3]	130
LNX-8513DS-VTM w/ Mount Pipe	140	2.4" Dia x 4-ft Mount Pipe	130
BXA-70063/6CF w/ Mount Pipe	140	2.4" Dia x 4-ft Mount Pipe	130
BXA-70063/6CF w/ Mount Pipe	140	2.4" Dia x 4-ft Mount Pipe	130
BXA-70063/6CF w/ Mount Pipe	140	KS24019-L112A	80
Platform Mount [LP 304-1]	140	Side Arm Mount [SO 701-1]	80

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
MPRF-Fy=65ks Density=100%	65 ksi	80 ksi			

TOWER DESIGN NOTES

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

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

Job:	*Westbrook / Orsina (BU 876384)*		
Project:	*TEP No. 25589.31758*		
Client:	Crown Castle	Drawn by: GJS	App'd:
Code:	TIA/EIA-222-F	Date: 04/23/15	Scale: N
Path:			Dwg No.

Tower Input Data

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

Tower is located in Middlesex County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.750 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	150.00-133.71	16.29	2.58	18	13.000	16.650	0.188	0.750	MPRF-Fy=65ksi, Density=100% (65 ksi)
L2	133.71-108.50	27.79	0.00	18	15.696	21.855	0.313	1.250	MPRF-Fy=65ksi, Density=100% (65 ksi)
L3	108.50-88.08	20.42	3.83	18	21.855	26.380	0.511	2.044	MPRF-Fy=65ksi

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L4	88.08-83.00	8.92	0.00	18	24.905	26.879	0.564	2.257	i, Density=100% (65 ksi) MPRF-Fy=65ksi, Density=100% (65 ksi)
L5	83.00-63.00	20.00	0.00	18	26.879	31.304	0.587	2.349	MPRF-Fy=65ksi, Density=100% (65 ksi)
L6	63.00-43.50	19.50	5.00	18	31.304	35.620	0.564	2.256	MPRF-Fy=65ksi, Density=100% (65 ksi)
L7	43.50-33.00	15.50	0.00	18	33.764	37.194	0.548	2.192	MPRF-Fy=65ksi, Density=100% (65 ksi)
L8	33.00-32.00	1.00	0.00	18	37.194	37.416	0.597	2.387	MPRF-Fy=65ksi, Density=100% (65 ksi)
L9	32.00-28.00	4.00	0.00	18	37.416	38.301	0.488	1.951	MPRF-Fy=65ksi, Density=100% (65 ksi)
L10	28.00-0.00	28.00		18	38.301	44.500	0.470	1.879	MPRF-Fy=65ksi, Density=100% (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	13.201	7.625	158.142	4.548	6.604	23.946	316.492	3.813	1.958	10.443
	16.907	9.797	335.454	5.844	8.458	39.660	671.349	4.900	2.600	13.869
L2	16.520	15.259	456.220	5.461	7.974	57.216	913.040	7.631	2.213	7.08
	22.193	21.368	1252.882	7.648	11.103	112.846	2507.413	10.686	3.297	10.549
L3	22.193	34.621	1992.710	7.577	11.103	179.482	3988.043	17.314	2.947	5.767
	26.787	41.960	3547.547	9.183	13.401	264.722	7099.762	20.984	3.743	7.325
L4	26.151	43.596	3263.404	8.641	12.652	257.936	6531.101	21.802	3.390	6.008
	27.293	47.130	4123.067	9.342	13.654	301.960	8251.559	23.570	3.737	6.623
L5	27.293	49.005	4279.607	9.333	13.654	313.425	8564.844	24.507	3.697	6.296
	31.787	57.254	6824.985	10.905	15.903	429.175	13658.950	28.632	4.476	7.622
L6	31.787	55.021	6568.755	10.913	15.903	413.063	13146.154	27.516	4.517	8.01
	36.169	62.746	9741.987	12.445	18.095	538.381	19496.792	31.379	5.277	9.357
L7	35.408	57.780	8053.779	11.792	17.152	469.556	16118.155	28.896	4.978	9.082
	37.768	63.748	10815.954	13.009	18.895	572.433	21646.139	31.880	5.582	10.184
L8	37.768	69.325	11730.952	12.992	18.895	620.859	23477.340	34.669	5.496	9.209
	37.993	69.745	11945.131	13.071	19.007	628.454	23905.979	34.879	5.535	9.274
L9	37.993	57.168	9849.124	13.109	19.007	518.179	19711.207	28.589	5.727	11.741
	38.892	58.538	10574.802	13.424	19.457	543.495	21163.519	29.275	5.883	12.061
L10	38.892	56.405	10199.132	13.430	19.457	524.188	20411.684	28.208	5.914	12.59
	45.186	65.647	16078.908	15.631	22.606	711.267	32178.974	32.830	7.005	14.913

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 150.00-133.71				1	1	1		
L2 133.71-108.50				1	1	1		
L3 108.50-88.08				1	1	0.616363		
L4 88.08-83.00				1	1	0.669336		
L5 83.00-63.00				1	1	0.642985		
L6 63.00-43.50				1	1	0.668695		
L7 43.50-33.00				1	1	0.687457		
L8 33.00-32.00				1	1	0.632128		
L9 32.00-28.00				1	1	0.771147		
L10 28.00-0.00				1	1	0.80003		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
Safety Line 3/8	A	No	CaAa (Out Of Face)	150.00 - 0.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46
Step Pegs (5/8" SR) 7-in. w/30" step	A	No	CaAa (Out Of Face)	150.00 - 0.00	1	No Ice	0.03	0.49
						1/2" Ice	0.14	1.01
						1" Ice	0.23	2.07
						2" Ice	0.43	6.09
						4" Ice	0.83	21.46
A Face								
LDF7-50A(1-5/8")	A	No	Inside Pole	150.00 - 0.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
B Face								
LDF4-50A(1/2")	B	No	Inside Pole	80.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
LDF7-50A(1-5/8")	B	No	Inside Pole	130.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
WR-VG122ST-BRDA(7/16)	B	No	CaAa (Out Of Face)	130.00 - 110.00	1	No Ice	0.05	0.14
						1/2" Ice	0.15	0.73
						1" Ice	0.25	1.92
						2" Ice	0.45	6.15
						4" Ice	0.85	21.94
WR-VG122ST-BRDA(7/16)	B	No	CaAa (Out Of Face)	130.00 - 110.00	1	No Ice	0.00	0.14
						1/2" Ice	0.00	0.73
						1" Ice	0.00	1.92

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
						2" Ice	0.00	6.15
						4" Ice	0.00	21.94
WR-VG122ST-BRDA(7/16)	B	No	CaAa (Out Of Face)	110.00 - 0.00	2	No Ice	0.00	0.14
						1/2" Ice	0.00	0.73
						1" Ice	0.00	1.92
						2" Ice	0.00	6.15
						4" Ice	0.00	21.94
WR-VG122ST-BRDA(3/8)	B	No	CaAa (Out Of Face)	130.00 - 0.00	1	No Ice	0.00	0.20
						1/2" Ice	0.00	0.74
						1" Ice	0.00	1.89
						2" Ice	0.00	6.03
						4" Ice	0.00	21.63
C Face								
LCF158-50JA-A7(1 5/8")	C	No	Inside Pole	140.00 - 0.00	12	No Ice	0.00	0.80
						1/2" Ice	0.00	0.80
						1" Ice	0.00	0.80
						2" Ice	0.00	0.80
						4" Ice	0.00	0.80
LCF158-50JA-A7(1 5/8")	C	No	CaAa (Out Of Face)	140.00 - 0.00	6	No Ice	0.00	0.80
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
LCF158-50JA-A7(1 5/8")	C	No	CaAa (Out Of Face)	140.00 - 0.00	1	No Ice	0.20	0.80
						1/2" Ice	0.30	2.31
						1" Ice	0.40	4.44
						2" Ice	0.60	10.52
						4" Ice	1.00	30.02
Proposed Mods								
CCI-65FP-060100	A	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.17	20.42
						1/2" Ice	0.28	21.37
						1" Ice	0.39	22.66
						2" Ice	0.61	26.29
						4" Ice	1.06	37.70
CCI-65FP-060100	B	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	C	No	CaAa (Out Of Face)	30.00 - 0.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	A	No	CaAa (Out Of Face)	30.00 - 0.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
***								
CCI-65FP-060100	A	No	CaAa (Out Of Face)	65.00 - 35.00	1	No Ice	0.17	20.42
						1/2" Ice	0.28	21.37
						1" Ice	0.39	22.66
						2" Ice	0.61	26.29
						4" Ice	1.06	37.70
CCI-65FP-060100	A	No	CaAa (Out Of Face)	35.00 - 30.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	B	No	CaAa (Out Of	65.00 - 30.00	1	No Ice	0.00	20.42

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
			Face)			1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	C	No	CaAa (Out Of Face)	65.00 - 30.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
***								
CCI-65FP-060100	A	No	CaAa (Out Of Face)	85.00 - 65.00	1	No Ice	0.17	20.42
						1/2" Ice	0.28	21.37
						1" Ice	0.39	22.66
						2" Ice	0.61	26.29
						4" Ice	1.06	37.70
CCI-65FP-060100	B	No	CaAa (Out Of Face)	85.00 - 65.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	C	No	CaAa (Out Of Face)	85.00 - 65.00	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
***								
CCI-65FP-045100	A	No	CaAa (Out Of Face)	110.00 - 85.00	1	No Ice	0.17	15.31
						1/2" Ice	0.28	16.17
						1" Ice	0.39	17.36
						2" Ice	0.61	20.80
						4" Ice	1.06	31.82
CCI-65FP-045100	A	No	CaAa (Out Of Face)	110.00 - 85.00	1	No Ice	0.00	15.31
						1/2" Ice	0.00	16.17
						1" Ice	0.00	17.36
						2" Ice	0.00	20.80
						4" Ice	0.00	31.82
CCI-65FP-045100	A	No	CaAa (Out Of Face)	110.00 - 85.00	1	No Ice	0.00	15.31
						1/2" Ice	0.00	16.17
						1" Ice	0.00	17.36
						2" Ice	0.00	20.80
						4" Ice	0.00	31.82

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	150.00-133.71	A	0.000	0.000	0.000	1.181	0.09
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.245	0.10
L2	133.71-108.50	A	0.000	0.000	0.000	2.078	0.21
		B	0.000	0.000	0.000	0.920	0.22
		C	0.000	0.000	0.000	4.992	0.38
L3	108.50-88.08	A	0.000	0.000	0.000	4.883	1.05
		B	0.000	0.000	0.000	0.000	0.21
		C	0.000	0.000	0.000	4.043	0.31
L4	88.08-83.00	A	0.000	0.000	0.000	1.216	0.21
		B	0.000	0.000	0.000	0.000	0.09

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	1.006	0.12
L5	83.00-63.00	A	0.000	0.000	0.000	4.783	0.52
		B	0.000	0.000	0.000	0.000	0.62
		C	0.000	0.000	0.000	3.960	0.71
L6	63.00-43.50	A	0.000	0.000	0.000	4.665	0.51
		B	0.000	0.000	0.000	0.000	0.60
		C	0.000	0.000	0.000	3.862	0.69
L7	43.50-33.00	A	0.000	0.000	0.000	2.510	0.31
		B	0.000	0.000	0.000	0.000	0.37
		C	0.000	0.000	0.000	2.078	0.37
L8	33.00-32.00	A	0.000	0.000	0.000	0.239	0.05
		B	0.000	0.000	0.000	0.000	0.05
		C	0.000	0.000	0.000	0.198	0.04
L9	32.00-28.00	A	0.000	0.000	0.000	0.957	0.19
		B	0.000	0.000	0.000	0.000	0.16
		C	0.000	0.000	0.000	0.792	0.14
L10	28.00-0.00	A	0.000	0.000	0.000	6.697	1.30
		B	0.000	0.000	0.000	0.000	0.86
		C	0.000	0.000	0.000	5.544	1.00

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	150.00-133.71	A	0.893	0.000	0.000	0.000	7.001	0.13
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.369	0.09
L2	133.71-108.50	A	0.876	0.000	0.000	0.000	11.382	0.28
		B		0.000	0.000	0.000	4.493	0.32
		C		0.000	0.000	0.000	9.495	0.34
L3	108.50-88.08	A	0.855	0.000	0.000	0.000	15.740	1.20
		B		0.000	0.000	0.000	0.000	0.30
		C		0.000	0.000	0.000	7.532	0.27
L4	88.08-83.00	A	0.841	0.000	0.000	0.000	3.919	0.24
		B		0.000	0.000	0.000	0.000	0.12
		C		0.000	0.000	0.000	1.875	0.11
L5	83.00-63.00	A	0.825	0.000	0.000	0.000	15.045	0.60
		B		0.000	0.000	0.000	0.000	0.73
		C		0.000	0.000	0.000	7.259	0.71
L6	63.00-43.50	A	0.794	0.000	0.000	0.000	14.299	0.58
		B		0.000	0.000	0.000	0.000	0.71
		C		0.000	0.000	0.000	6.959	0.69
L7	43.50-33.00	A	0.763	0.000	0.000	0.000	7.696	0.36
		B		0.000	0.000	0.000	0.000	0.43
		C		0.000	0.000	0.000	3.745	0.37
L8	33.00-32.00	A	0.750	0.000	0.000	0.000	0.706	0.05
		B		0.000	0.000	0.000	0.000	0.06
		C		0.000	0.000	0.000	0.348	0.03
L9	32.00-28.00	A	0.750	0.000	0.000	0.000	2.823	0.21
		B		0.000	0.000	0.000	0.000	0.19
		C		0.000	0.000	0.000	1.392	0.14
L10	28.00-0.00	A	0.750	0.000	0.000	0.000	19.763	1.44
		B		0.000	0.000	0.000	0.000	1.01
		C		0.000	0.000	0.000	9.744	0.98

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	150.00-133.71	-0.095	-0.042	-0.128	-0.332
L2	133.71-108.50	-0.174	0.042	-0.148	-0.153
L3	108.50-88.08	-0.211	-0.173	-0.293	-0.537
L4	88.08-83.00	-0.214	-0.175	-0.302	-0.555
L5	83.00-63.00	-0.218	-0.178	-0.311	-0.565
L6	63.00-43.50	-0.222	-0.182	-0.322	-0.579
L7	43.50-33.00	-0.225	-0.184	-0.329	-0.591
L8	33.00-32.00	-0.225	-0.184	-0.328	-0.578
L9	32.00-28.00	-0.226	-0.185	-0.329	-0.581
L10	28.00-0.00	-0.228	-0.187	-0.337	-0.595

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
150									
(2) DB980H90E-M w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 2.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.07 0.11 0.22 0.55
(2) DB980H90E-M w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 2.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.07 0.11 0.22 0.55
(2) DB980H90E-M w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 2.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.07 0.11 0.22 0.55
2.4" Dia. x 6' Mount Pipe	A	From Centroid-Face	4.00 2.00 0.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.93 2.32 3.15 5.06	1.43 1.93 2.32 3.15 5.06	0.02 0.04 0.06 0.10 0.25
2.4" Dia. x 6' Mount Pipe	B	From Centroid-Face	4.00 2.00 0.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.93 2.32 3.15 5.06	1.43 1.93 2.32 3.15 5.06	0.02 0.04 0.06 0.10 0.25
2.4" Dia. x 6' Mount Pipe	C	From Centroid-Face	4.00 2.00 0.00	0.000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.93 2.32 3.15 5.06	1.43 1.93 2.32 3.15 5.06	0.02 0.04 0.06 0.10 0.25
Platform Mount [LP 712-1]	C	None		0.000	150.00	No Ice	24.53	24.53	1.34

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1/2" Ice	29.94	29.94	1.65
						1" Ice	35.35	35.35	1.96
						2" Ice	46.17	46.17	2.58
						4" Ice	67.81	67.81	3.82
148 *140*									
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Centroid-Leg	4.00 4.50 0.00	10.000	140.00	No Ice	8.98	6.96	0.07
						1/2" Ice	9.65	8.18	0.14
						1" Ice	10.29	9.14	0.21
						2" Ice	11.59	11.02	0.40
						4" Ice	14.32	15.03	0.91
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Centroid-Leg	4.00 4.50 0.00	0.000	140.00	No Ice	8.98	6.96	0.07
						1/2" Ice	9.65	8.18	0.14
						1" Ice	10.29	9.14	0.21
						2" Ice	11.59	11.02	0.40
						4" Ice	14.32	15.03	0.91
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Centroid-Leg	4.00 4.50 0.00	30.000	140.00	No Ice	8.98	6.96	0.07
						1/2" Ice	9.65	8.18	0.14
						1" Ice	10.29	9.14	0.21
						2" Ice	11.59	11.02	0.40
						4" Ice	14.32	15.03	0.91
RRH2X60-PCS	A	From Centroid-Leg	4.00 3.00 0.00	10.000	140.00	No Ice	2.57	2.01	0.06
						1/2" Ice	2.79	2.22	0.08
						1" Ice	3.02	2.43	0.10
						2" Ice	3.52	2.89	0.16
						4" Ice	4.61	3.92	0.31
RRH2X60-PCS	B	From Centroid-Leg	4.00 3.00 0.00	0.000	140.00	No Ice	2.57	2.01	0.06
						1/2" Ice	2.79	2.22	0.08
						1" Ice	3.02	2.43	0.10
						2" Ice	3.52	2.89	0.16
						4" Ice	4.61	3.92	0.31
RRH2X60-PCS	C	From Centroid-Leg	4.00 3.00 0.00	30.000	140.00	No Ice	2.57	2.01	0.06
						1/2" Ice	2.79	2.22	0.08
						1" Ice	3.02	2.43	0.10
						2" Ice	3.52	2.89	0.16
						4" Ice	4.61	3.92	0.31
RRH2X60-AWS	A	From Centroid-Leg	4.00 6.00 0.00	10.000	140.00	No Ice	3.96	1.82	0.06
						1/2" Ice	4.27	2.08	0.08
						1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
RRH2X60-AWS	B	From Centroid-Leg	4.00 6.00 0.00	0.000	140.00	No Ice	3.96	1.82	0.06
						1/2" Ice	4.27	2.08	0.08
						1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
RRH2X60-AWS	C	From Centroid-Leg	4.00 6.00 0.00	30.000	140.00	No Ice	3.96	1.82	0.06
						1/2" Ice	4.27	2.08	0.08
						1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
DB-T1-6Z-8AB-0Z	A	From Centroid-Leg	4.00 6.00 0.00	10.000	140.00	No Ice	5.60	2.33	0.04
						1/2" Ice	5.92	2.56	0.08
						1" Ice	6.24	2.79	0.12
						2" Ice	6.91	3.28	0.21
						4" Ice	8.37	4.37	0.45
LNX-8513DS-VTM w/	A	From	4.00	10.000	140.00	No Ice	8.65	7.08	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe		Centroid-Leg	-3.00 0.00			1/2" Ice	9.31	8.27	0.13
						1" Ice	9.93	9.18	0.21
						2" Ice	11.20	11.02	0.39
						4" Ice	13.87	15.06	0.90
LNX-6514DS-VTM w/ Mount Pipe	B	From Centroid-Leg	4.00 -3.00 0.00	0.000	140.00	No Ice	8.65	7.08	0.06
						1/2" Ice	9.31	8.27	0.13
						1" Ice	9.93	9.18	0.21
						2" Ice	11.20	11.02	0.39
						4" Ice	13.87	15.06	0.90
LNX-8513DS-VTM w/ Mount Pipe	C	From Centroid-Leg	4.00 -3.00 0.00	30.000	140.00	No Ice	8.65	7.08	0.06
						1/2" Ice	9.31	8.27	0.13
						1" Ice	9.93	9.18	0.21
						2" Ice	11.20	11.02	0.39
						4" Ice	13.87	15.06	0.90
BXA-70063/6CF w/ Mount Pipe	A	From Centroid-Leg	4.00 -6.00 0.00	10.000	140.00	No Ice	7.75	5.18	0.04
						1/2" Ice	8.29	6.11	0.10
						1" Ice	8.85	6.92	0.16
						2" Ice	9.97	8.59	0.31
						4" Ice	12.34	12.13	0.75
BXA-70063/6CF w/ Mount Pipe	B	From Centroid-Leg	4.00 -6.00 0.00	0.000	140.00	No Ice	7.75	5.18	0.04
						1/2" Ice	8.29	6.11	0.10
						1" Ice	8.85	6.92	0.16
						2" Ice	9.97	8.59	0.31
						4" Ice	12.34	12.13	0.75
BXA-70063/6CF w/ Mount Pipe	C	From Centroid-Leg	4.00 -6.00 0.00	30.000	140.00	No Ice	7.75	5.18	0.04
						1/2" Ice	8.29	6.11	0.10
						1" Ice	8.85	6.92	0.16
						2" Ice	9.97	8.59	0.31
						4" Ice	12.34	12.13	0.75
Platform Mount [LP 304-1]	C	None		0.000	140.00	No Ice	17.46	17.46	1.35
						1/2" Ice	22.44	22.44	1.62
						1" Ice	27.42	27.42	1.90
						2" Ice	37.38	37.38	2.45
						4" Ice	57.30	57.30	3.55
130									
(2) 7770.00 w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	-20.000	130.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	-10.000	130.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	-10.000	130.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) LGP21401	A	From Centroid-Face	4.00 -5.00 0.00	-20.000	130.00	No Ice	0.00	0.23	0.01
						1/2" Ice	0.00	0.31	0.02
						1" Ice	0.00	0.40	0.03
						2" Ice	0.00	0.61	0.05
						4" Ice	0.00	1.12	0.14
(2) LGP21401	B	From Centroid-Fa	4.00 -5.00	-10.000	130.00	No Ice	0.00	0.23	0.01
						1/2" Ice	0.00	0.31	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		ce	0.00			1" Ice	0.00	0.40	0.03
						2" Ice	0.00	0.61	0.05
						4" Ice	0.00	1.12	0.14
(2) LGP21401	C	From Centroid-Face	4.00 -5.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21901	A	From Centroid-Face	4.00 5.00 0.00	-20.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
(2) LGP21901	B	From Centroid-Face	4.00 5.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
(2) LGP21901	C	From Centroid-Face	4.00 5.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
RRUS 11	A	From Centroid-Face	4.00 0.00 0.00	70.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
RRUS 11	B	From Centroid-Face	4.00 0.00 0.00	80.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
RRUS 11	C	From Centroid-Face	4.00 0.00 0.00	80.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
DBXNH-6565B-R2M w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	-20.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.73 9.39 10.02 11.30 13.99	7.16 8.36 9.29 11.14 15.20	0.08 0.15 0.23 0.41 0.92
P65-16-XLH-RR w/ Mount Pipe	B	From Centroid-Face	4.00 -3.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.64 9.29 9.91 11.18 13.83	6.36 7.54 8.43 10.24 14.10	0.08 0.14 0.22 0.39 0.89
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.30 7.48 8.37 10.18 14.02	0.07 0.14 0.21 0.38 0.87
DC6-48-60-18-8F	C	From Centroid-Face	4.00 0.00 0.00	-10.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.27 1.46 1.66 2.09	1.27 1.46 1.66 2.09	0.02 0.04 0.05 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	3.10	3.10	0.21
Platform Mount [LP 304-1]	C	None		0.000	130.00	No Ice	17.46	17.46	1.35
						1/2" Ice	22.44	22.44	1.62
						1" Ice	27.42	27.42	1.90
						2" Ice	37.38	37.38	2.45
						4" Ice	57.30	57.30	3.55
Side Arm Mount [SO 701-3]	C	None		0.000	130.00	No Ice	2.83	2.83	0.20
						1/2" Ice	3.92	3.92	0.24
						1" Ice	5.01	5.01	0.28
						2" Ice	7.19	7.19	0.36
						4" Ice	11.55	11.55	0.53
2.4" Dia x 4-ft Mount Pipe	A	From Centroid-Face	3.00 0.00 0.00	0.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.87 1.12 1.37 1.91 3.24	0.87 1.12 1.37 1.91 3.24	0.01 0.02 0.03 0.06 0.16
2.4" Dia x 4-ft Mount Pipe	B	From Centroid-Face	3.00 0.00 0.00	0.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.87 1.12 1.37 1.91 3.24	0.87 1.12 1.37 1.91 3.24	0.01 0.02 0.03 0.06 0.16
2.4" Dia x 4-ft Mount Pipe	C	From Centroid-Face	3.00 0.00 0.00	0.000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.87 1.12 1.37 1.91 3.24	0.87 1.12 1.37 1.91 3.24	0.01 0.02 0.03 0.06 0.16
* *80* KS24019-L112A	C	From Leg	3.00 0.00 1.00	0.000	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.09 0.15 0.22 0.40 0.89	0.09 0.15 0.22 0.40 0.89	0.01 0.01 0.01 0.02 0.04
Side Arm Mount [SO 701-1]	C	From Leg	1.50 0.00 0.00	30.000	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.85 1.14 1.43 2.01 3.17	1.67 2.34 3.01 4.35 7.03	0.07 0.08 0.09 0.12 0.18

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

Comb. No.	Description
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	150 - 133.71	Pole	Max Tension	30	0.00	0.00	0.00
			Max. Compression	14	-8.22	-0.66	0.48
			Max. Mx	5	-3.28	-67.59	-0.16
			Max. My	2	-3.31	0.38	66.98
			Max. Vy	11	-9.76	67.15	0.69
			Max. Vx	2	-9.61	0.38	66.98
			Max. Torque	9			1.55
L2	133.71 - 108.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.86	-0.35	0.99
			Max. Mx	5	-8.14	-454.22	-2.57
			Max. My	2	-8.17	2.96	449.92
			Max. Vy	11	-15.77	454.21	3.29
			Max. Vx	2	-15.62	2.96	449.92
			Max. Torque	9			1.55
L3	108.5 - 88.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.04	-0.37	1.86
			Max. Mx	11	-10.93	725.95	5.42
			Max. My	2	-10.95	4.42	719.86
			Max. Vy	11	-17.03	725.95	5.42
			Max. Vx	2	-16.88	4.42	719.86
			Max. Torque	2			-0.55
L4	88.0833 - 83	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-21.45	-0.38	2.23
			Max. Mx	11	-12.97	881.29	6.49
			Max. My	2	-12.99	5.21	874.14
			Max. Vy	11	-17.78	881.29	6.49
			Max. Vx	2	-17.63	5.21	874.14
			Max. Torque	13			-0.53
L5	83 - 63	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.53	-0.17	2.08
			Max. Mx	11	-17.47	1253.01	8.03
			Max. My	2	-17.48	7.15	1243.03
			Max. Vy	11	-19.37	1253.01	8.03
			Max. Vx	2	-19.25	7.15	1243.03
			Max. Torque	13			-0.53
L6	63 - 43.4967	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30.39	-0.18	2.05
			Max. Mx	11	-20.92	1541.46	9.21
			Max. My	2	-20.93	8.45	1529.67
			Max. Vy	11	-20.42	1541.46	9.21
			Max. Vx	2	-20.31	8.45	1529.67
			Max. Torque	13			-0.33
L7	43.4967 - 33	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-35.66	-0.26	2.06
			Max. Mx	11	-25.54	1867.14	10.48
			Max. My	2	-25.55	9.79	1853.51
			Max. Vy	11	-21.55	1867.14	10.48
			Max. Vx	2	-21.43	9.79	1853.51
			Max. Torque	13			-0.32
L8	33 - 32	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-35.99	-0.29	2.07
			Max. Mx	11	-25.84	1888.69	10.57
			Max. My	2	-25.84	9.85	1874.98
			Max. Vy	11	-21.61	1888.69	10.57
			Max. Vx	2	-21.50	9.85	1874.98
			Max. Torque	13			-0.31
L9	32 - 28	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-37.28	-0.35	2.17
			Max. Mx	11	-27.01	1975.55	10.99
			Max. My	2	-27.01	10.15	1961.49
			Max. Vy	11	-21.85	1975.55	10.99
			Max. Vx	2	-21.74	10.15	1961.49
			Max. Torque	13			-0.31
L10	28 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-46.45	-0.37	3.18
			Max. Mx	11	-35.35	2610.51	14.12
			Max. My	2	-35.35	12.62	2594.00
			Max. Vy	11	-23.53	2610.51	14.12
			Max. Vx	2	-23.42	12.62	2594.00
			Max. Torque	13			-0.30

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	15	46.45	0.01	6.19
	Max. H_x	11	35.36	23.51	0.08
	Max. H_z	2	35.36	0.08	23.41

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. M_x	2	2594.00	0.08	23.41
	Max. M_z	5	2609.09	-23.51	-0.08
	Max. Torsion	6	0.28	-20.40	-11.77
	Min. Vert	1	35.36	0.00	0.00
	Min. H_x	5	35.36	-23.51	-0.08
	Min. H_z	8	35.36	-0.08	-23.41
	Min. M_x	8	-2589.59	-0.08	-23.41
	Min. M_z	11	-2610.51	23.51	0.08
	Min. Torsion	13	-0.28	11.83	20.31

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	35.36	0.00	0.00	-2.16	0.69	-0.00
Dead+Wind 0 deg - No Ice	35.36	-0.08	-23.41	-2594.00	12.62	0.21
Dead+Wind 30 deg - No Ice	35.36	11.69	-20.23	-2240.85	-1293.94	0.08
Dead+Wind 60 deg - No Ice	35.36	20.32	-11.63	-1287.80	-2253.57	-0.08
Dead+Wind 90 deg - No Ice	35.36	23.51	0.08	9.69	-2609.09	-0.21
Dead+Wind 120 deg - No Ice	35.36	20.40	11.77	1303.92	-2265.37	-0.28
Dead+Wind 150 deg - No Ice	35.36	11.83	20.31	2248.23	-1314.51	-0.28
Dead+Wind 180 deg - No Ice	35.36	0.08	23.41	2589.59	-11.19	-0.21
Dead+Wind 210 deg - No Ice	35.36	-11.69	20.23	2236.42	1295.39	-0.08
Dead+Wind 240 deg - No Ice	35.36	-20.32	11.63	1283.36	2255.00	0.07
Dead+Wind 270 deg - No Ice	35.36	-23.51	-0.08	-14.12	2610.51	0.20
Dead+Wind 300 deg - No Ice	35.36	-20.40	-11.77	-1308.34	2266.78	0.28
Dead+Wind 330 deg - No Ice	35.36	-11.83	-20.31	-2252.64	1315.93	0.28
Dead+Ice+Temp	46.45	0.00	-0.00	-3.18	-0.37	-0.00
Dead+Wind 0 deg+Ice+Temp	46.45	-0.01	-6.19	-711.84	1.35	0.01
Dead+Wind 30 deg+Ice+Temp	46.45	3.08	-5.35	-616.04	-353.30	-0.09
Dead+Wind 60 deg+Ice+Temp	46.45	5.35	-3.08	-356.06	-613.39	-0.16
Dead+Wind 90 deg+Ice+Temp	46.45	6.18	0.01	-1.55	-709.23	-0.19
Dead+Wind 120 deg+Ice+Temp	46.45	5.36	3.10	352.50	-615.13	-0.17
Dead+Wind 150 deg+Ice+Temp	46.45	3.10	5.36	611.21	-356.31	-0.10
Dead+Wind 180 deg+Ice+Temp	46.45	0.01	6.19	705.27	-2.12	-0.01
Dead+Wind 210 deg+Ice+Temp	46.45	-3.08	5.35	609.47	352.53	0.09
Dead+Wind 240 deg+Ice+Temp	46.45	-5.35	3.08	349.49	612.62	0.16
Dead+Wind 270 deg+Ice+Temp	46.45	-6.18	-0.01	-5.02	708.45	0.19
Dead+Wind 300 deg+Ice+Temp	46.45	-5.36	-3.10	-359.06	614.36	0.17
Dead+Wind 330 deg+Ice+Temp	46.45	-3.10	-5.36	-617.78	355.54	0.10
Dead+Wind 0 deg - Service	35.36	-0.03	-8.10	-901.01	4.84	0.08
Dead+Wind 30 deg - Service	35.36	4.04	-7.00	-778.54	-448.25	0.03
Dead+Wind 60 deg - Service	35.36	7.03	-4.03	-448.05	-781.05	-0.02
Dead+Wind 90 deg - Service	35.36	8.14	0.03	1.90	-904.36	-0.07
Dead+Wind 120 deg - Service	35.36	7.06	4.07	450.75	-785.18	-0.10
Dead+Wind 150 deg - Service	35.36	4.09	7.03	778.22	-455.41	-0.10
Dead+Wind 180 deg - Service	35.36	0.03	8.10	896.56	-3.42	-0.08
Dead+Wind 210 deg - Service	35.36	-4.04	7.00	774.09	449.68	-0.03
Dead+Wind 240 deg - Service	35.36	-7.03	4.03	443.59	782.47	0.02
Dead+Wind 270 deg - Service	35.36	-8.14	-0.03	-6.36	905.78	0.07
Dead+Wind 300 deg - Service	35.36	-7.06	-4.07	-455.20	786.59	0.10
Dead+Wind 330 deg - Service	35.36	-4.09	-7.03	-782.67	456.83	0.10

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-35.36	0.00	0.00	35.36	0.00	0.000%
2	-0.08	-35.36	-23.41	0.08	35.36	23.41	0.000%
3	11.69	-35.36	-20.23	-11.69	35.36	20.23	0.000%
4	20.32	-35.36	-11.63	-20.32	35.36	11.63	0.000%
5	23.51	-35.36	0.08	-23.51	35.36	-0.08	0.000%
6	20.40	-35.36	11.77	-20.40	35.36	-11.77	0.000%
7	11.83	-35.36	20.31	-11.83	35.36	-20.31	0.000%
8	0.08	-35.36	23.41	-0.08	35.36	-23.41	0.000%
9	-11.69	-35.36	20.23	11.69	35.36	-20.23	0.000%
10	-20.32	-35.36	11.63	20.32	35.36	-11.63	0.000%
11	-23.51	-35.36	-0.08	23.51	35.36	0.08	0.000%
12	-20.40	-35.36	-11.77	20.40	35.36	11.77	0.000%
13	-11.83	-35.36	-20.31	11.83	35.36	20.31	0.000%
14	0.00	-46.45	0.00	-0.00	46.45	0.00	0.000%
15	-0.01	-46.45	-6.19	0.01	46.45	6.19	0.000%
16	3.08	-46.45	-5.35	-3.08	46.45	5.35	0.000%
17	5.35	-46.45	-3.08	-5.35	46.45	3.08	0.000%
18	6.18	-46.45	0.01	-6.18	46.45	-0.01	0.000%
19	5.36	-46.45	3.10	-5.36	46.45	-3.10	0.000%
20	3.10	-46.45	5.36	-3.10	46.45	-5.36	0.000%
21	0.01	-46.45	6.19	-0.01	46.45	-6.19	0.000%
22	-3.08	-46.45	5.35	3.08	46.45	-5.35	0.000%
23	-5.35	-46.45	3.08	5.35	46.45	-3.08	0.000%
24	-6.18	-46.45	-0.01	6.18	46.45	0.01	0.000%
25	-5.36	-46.45	-3.10	5.36	46.45	3.10	0.000%
26	-3.10	-46.45	-5.36	3.10	46.45	5.36	0.000%
27	-0.03	-35.36	-8.10	0.03	35.36	8.10	0.000%
28	4.04	-35.36	-7.00	-4.04	35.36	7.00	0.000%
29	7.03	-35.36	-4.03	-7.03	35.36	4.03	0.000%
30	8.14	-35.36	0.03	-8.14	35.36	-0.03	0.000%
31	7.06	-35.36	4.07	-7.06	35.36	-4.07	0.000%
32	4.09	-35.36	7.03	-4.09	35.36	-7.03	0.000%
33	0.03	-35.36	8.10	-0.03	35.36	-8.10	0.000%
34	-4.04	-35.36	7.00	4.04	35.36	-7.00	0.000%
35	-7.03	-35.36	4.03	7.03	35.36	-4.03	0.000%
36	-8.14	-35.36	-0.03	8.14	35.36	0.03	0.000%
37	-7.06	-35.36	-4.07	7.06	35.36	4.07	0.000%
38	-4.09	-35.36	-7.03	4.09	35.36	7.03	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00003916
3	Yes	6	0.00000001	0.00020891
4	Yes	6	0.00000001	0.00020753
5	Yes	5	0.00000001	0.00004101
6	Yes	6	0.00000001	0.00020875
7	Yes	6	0.00000001	0.00021171
8	Yes	5	0.00000001	0.00011550
9	Yes	6	0.00000001	0.00020639
10	Yes	6	0.00000001	0.00020811

11	Yes	5	0.00000001	0.00009132
12	Yes	6	0.00000001	0.00021208
13	Yes	6	0.00000001	0.00020878
14	Yes	4	0.00000001	0.00006212
15	Yes	6	0.00000001	0.00010411
16	Yes	6	0.00000001	0.00014062
17	Yes	6	0.00000001	0.00014105
18	Yes	6	0.00000001	0.00010376
19	Yes	6	0.00000001	0.00013960
20	Yes	6	0.00000001	0.00014042
21	Yes	6	0.00000001	0.00010286
22	Yes	6	0.00000001	0.00013854
23	Yes	6	0.00000001	0.00013824
24	Yes	6	0.00000001	0.00010355
25	Yes	6	0.00000001	0.00014216
26	Yes	6	0.00000001	0.00014119
27	Yes	4	0.00000001	0.00035094
28	Yes	5	0.00000001	0.00036635
29	Yes	5	0.00000001	0.00036300
30	Yes	4	0.00000001	0.00031728
31	Yes	5	0.00000001	0.00036639
32	Yes	5	0.00000001	0.00037546
33	Yes	4	0.00000001	0.00042028
34	Yes	5	0.00000001	0.00035574
35	Yes	5	0.00000001	0.00036180
36	Yes	4	0.00000001	0.00036307
37	Yes	5	0.00000001	0.00038113
38	Yes	5	0.00000001	0.00036921

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	150 - 148.946	TP16.65x13x0.188	16.29	0.00	0.0	39.000	7.766	-1.23	302.86	0.004
	148.946 - 147.891					39.000	7.906	-1.26	308.34	0.004
	147.891 - 146.837					39.000	8.047	-1.30	313.83	0.004
	146.837 - 145.783					39.000	8.187	-1.33	319.31	0.004
	145.783 - 144.728					39.000	8.328	-1.37	324.79	0.004
	144.728 - 143.674					39.000	8.469	-1.40	330.28	0.004
	143.674 - 142.619					39.000	8.609	-1.44	335.76	0.004
	142.619 - 141.565					39.000	8.750	-1.48	341.24	0.004
	141.565 - 140.511					39.000	8.890	-1.52	346.73	0.004
	140.511 - 139.456					39.000	9.031	-3.17	352.21	0.009
	139.456 - 138.402					39.000	9.172	-3.19	357.69	0.009

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 $\frac{P}{P_a}$
	138.402 - 137.348					39.000	9.312	-3.22	363.18	0.009
	137.348 - 136.293					39.000	9.453	-3.27	368.66	0.009
	136.293 - 133.71					39.000	9.797	-1.35	382.09	0.004
L2	136.293 - 133.71	TP21.855x15.696x0.313	27.79	0.00	0.0	39.000	15.826	-2.17	617.23	0.004
	133.71 - 132.383					39.000	16.118	-3.63	628.61	0.006
	132.383 - 131.056					39.000	16.410	-3.75	639.98	0.006
	131.056 - 129.729					39.000	16.701	-5.74	651.36	0.009
	129.729 - 128.403					39.000	16.993	-5.87	662.73	0.009
	128.403 - 127.076					39.000	17.285	-6.00	674.11	0.009
	127.076 - 125.749					39.000	17.576	-6.14	685.48	0.009
	125.749 - 124.422					39.000	17.868	-6.28	696.86	0.009
	124.422 - 123.095					39.000	18.160	-6.42	708.23	0.009
	123.095 - 121.768					39.000	18.451	-6.56	719.60	0.009
	121.768 - 120.442					39.000	18.743	-6.71	730.98	0.009
	120.442 - 119.115					39.000	19.035	-6.86	742.35	0.009
	119.115 - 117.788					39.000	19.326	-7.01	753.73	0.009
	117.788 - 116.461					39.000	19.618	-7.17	765.10	0.009
	116.461 - 115.134					39.000	19.910	-7.32	776.48	0.009
	115.134 - 113.807					39.000	20.201	-7.48	787.85	0.009
	113.807 - 112.481					39.000	20.493	-7.64	799.23	0.010
	112.481 - 111.154					39.000	20.785	-7.80	810.60	0.010
	111.154 - 109.827					39.000	21.076	-7.97	821.97	0.010
	109.827 - 108.5					39.000	21.368	-8.13	833.35	0.010
L3	108.5 - 107.464	TP26.38x21.855x0.511	20.42	0.00	0.0	39.000	34.993	-8.31	1364.74	0.006
	107.464 - 106.427					39.000	35.366	-8.48	1379.27	0.006
	106.427 - 105.391					39.000	35.738	-8.65	1393.80	0.006
	105.391 - 104.354					39.000	36.111	-8.82	1408.33	0.006
	104.354 - 103.318					39.000	36.484	-8.99	1422.86	0.006
	103.318 - 102.281					39.000	36.856	-9.16	1437.39	0.006
	102.281 - 101.245					39.000	37.229	-9.33	1451.92	0.006
	101.245 - 100.208					39.000	37.601	-9.50	1466.45	0.006

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 $\frac{P}{P_a}$
	100.208 - 99.1719					39.000	37.974	-9.68	1480.98	0.007
	99.1719 - 98.1354					39.000	38.346	-9.85	1495.51	0.007
	98.1354 - 97.099					39.000	38.719	-10.03	1510.04	0.007
	97.099 - 96.0625					39.000	39.092	-10.20	1524.57	0.007
	96.0625 - 95.026					39.000	39.464	-10.38	1539.10	0.007
	95.026 - 93.9896					39.000	39.837	-10.56	1553.63	0.007
	93.9896 - 92.9531					39.000	40.209	-10.74	1568.16	0.007
	92.9531 - 91.9167					39.000	40.582	-10.92	1582.69	0.007
	91.9167 - 88.0833					39.000	41.960	-5.82	1636.43	0.004
L4	91.9167 - 88.0833	TP26.879x24.905x0.564	8.92	0.00	0.0	39.000	45.116	-6.12	1759.50	0.003
	88.0833 - 87.0667					39.000	45.518	-12.15	1775.22	0.007
	87.0667 - 86.05					39.000	45.921	-12.35	1790.93	0.007
	86.05 - 85.0333					39.000	46.324	-12.55	1806.65	0.007
	85.0333 - 84.0167					39.000	46.727	-12.76	1822.36	0.007
	84.0167 - 83					39.000	47.130	-12.96	1838.08	0.007
L5	83 - 82	TP31.304x26.879x0.587	20.00	0.00	0.0	39.000	49.417	-13.18	1927.28	0.007
	82 - 81					39.000	49.830	-13.39	1943.37	0.007
	81 - 80					39.000	50.242	-13.61	1959.45	0.007
	80 - 79					39.000	50.655	-13.89	1975.54	0.007
	79 - 78					39.000	51.067	-14.10	1991.62	0.007
	78 - 77					39.000	51.480	-14.32	2007.71	0.007
	77 - 76					39.000	51.892	-14.54	2023.80	0.007
	76 - 75					39.000	52.305	-14.76	2039.88	0.007
	75 - 74					39.000	52.717	-14.98	2055.97	0.007
	74 - 73					39.000	53.130	-15.20	2072.05	0.007
	73 - 72					39.000	53.542	-15.42	2088.14	0.007
	72 - 71					39.000	53.954	-15.64	2104.22	0.007
	71 - 70					39.000	54.367	-15.87	2120.31	0.007
	70 - 69					39.000	54.779	-16.09	2136.40	0.008
	69 - 68					39.000	55.192	-16.32	2152.48	0.008
	68 - 67					39.000	55.604	-16.55	2168.57	0.008
	67 - 66					39.000	56.017	-16.77	2184.65	0.008
	66 - 65					39.000	56.429	-17.00	2200.74	0.008
	65 - 64					39.000	56.842	-17.23	2216.82	0.008
	64 - 63					39.000	57.254	-17.46	2232.91	0.008
L6	63 - 61.964	TP35.62x31.304x0.564	19.50	0.00	0.0	39.000	55.431	-17.70	2161.82	0.008
	61.964 - 60.9281					39.000	55.842	-17.94	2177.82	0.008
	60.9281 - 59.8921					39.000	56.252	-18.18	2193.82	0.008
	59.8921 - 58.8562					39.000	56.662	-18.43	2209.83	0.008
	58.8562 - 57.8202					39.000	57.072	-18.67	2225.83	0.008
	57.8202 - 56.7843					39.000	57.483	-18.92	2241.83	0.008
	56.7843 - 55.7483					39.000	57.893	-19.16	2257.83	0.008

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 $\frac{P}{P_a}$
	55.7483 - 54.7124					39.000	58.303	-19.41	2273.83	0.009
	54.7124 - 53.6764					39.000	58.714	-19.66	2289.84	0.009
	53.6764 - 52.6405					39.000	59.124	-19.91	2305.84	0.009
	52.6405 - 51.6045					39.000	59.534	-20.16	2321.84	0.009
	51.6045 - 50.5686					39.000	59.945	-20.41	2337.84	0.009
	50.5686 - 49.5326					39.000	60.355	-20.66	2353.84	0.009
	49.5326 - 48.4967					39.000	60.765	-20.92	2369.85	0.009
	48.4967 - 43.4967					39.000	62.746	-11.78	2447.08	0.005
L7	48.4967 - 43.4967	TP37.194x33.764x0.548	15.50	0.00	0.0	39.000	57.780	-10.32	2253.43	0.005
	43.4967 - 42.447					39.000	59.706	-22.82	2328.53	0.010
	42.447 - 41.3973					39.000	60.110	-23.09	2344.30	0.010
	41.3973 - 40.3477					39.000	60.514	-23.36	2360.06	0.010
	40.3477 - 39.298					39.000	60.919	-23.63	2375.83	0.010
	39.298 - 38.2483					39.000	61.323	-23.90	2391.59	0.010
	38.2483 - 37.1987					39.000	61.727	-24.17	2407.36	0.010
	37.1987 - 36.149					39.000	62.131	-24.45	2423.12	0.010
	36.149 - 35.0993					39.000	62.536	-24.72	2438.89	0.010
	35.0993 - 34.0497					39.000	62.940	-25.00	2454.65	0.010
	34.0497 - 33					39.000	63.344	-25.28	2470.42	0.010
L8	33 - 32 (8)	TP37.416x37.194x0.597	1.00	0.00	0.0	39.000	69.326	-25.55	2703.69	0.009
L9	32 - 31	TP38.301x37.416x0.488	4.00	0.00	0.0	39.000	57.168	-25.85	2229.53	0.012
	31 - 30					39.000	57.510	-26.14	2242.90	0.012
	30 - 29					39.000	57.853	-26.44	2256.27	0.012
	29 - 28					39.000	58.196	-26.73	2269.63	0.012
L10	28 - 26.6	TP44.5x38.301x0.47	28.00	0.00	0.0	39.000	56.405	-27.03	2199.80	0.012
	26.6 - 25.2					39.000	56.867	-27.43	2217.82	0.012
	25.2 - 23.8					39.000	57.329	-27.83	2235.85	0.012
	23.8 - 22.4					39.000	57.792	-28.24	2253.87	0.013
	22.4 - 21					39.000	58.254	-28.64	2271.89	0.013
	21 - 19.6					39.000	58.716	-29.05	2289.91	0.013
	19.6 - 18.2					39.000	59.178	-29.46	2307.93	0.013
	18.2 - 16.8					39.000	59.640	-29.87	2325.96	0.013
	16.8 - 15.4					39.000	60.102	-30.28	2343.98	0.013
	15.4 - 14					39.000	60.564	-30.70	2362.00	0.013
	14 - 12.6					39.000	61.026	-31.12	2380.02	0.013
	12.6 - 11.2					39.000	61.488	-31.53	2398.04	0.013
	11.2 - 9.8					39.000	61.950	-31.95	2416.07	0.013
	9.8 - 8.4					39.000	62.412	-32.38	2434.09	0.013
	8.4 - 7					39.000	62.875	-32.80	2452.11	0.013
	7 - 5.6					39.000	63.337	-33.22	2470.13	0.013
	5.6 - 4.2					39.000	63.799	-33.65	2488.16	0.014
	4.2 - 2.8					39.000	64.261	-34.08	2506.18	0.014

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 $\frac{P}{P_a}$
	2.8 - 1.4					39.000	64.723	-34.51	2524.20	0.014
	1.4 - 0					39.000	65.185	-34.94	2542.22	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	150 - 148.946	TP16.65x13x0.188	5.09	2.461	39.000	0.063	0.00	0.000	39.000	0.000
	148.946 - 147.891		8.02	3.736	39.000	0.096	0.00	0.000	39.000	0.000
	147.891 - 146.837		10.99	4.943	39.000	0.127	0.00	0.000	39.000	0.000
	146.837 - 145.783		14.02	6.087	39.000	0.156	0.00	0.000	39.000	0.000
	145.783 - 144.728		17.10	7.174	39.000	0.184	0.00	0.000	39.000	0.000
	144.728 - 143.674		20.23	8.207	39.000	0.210	0.00	0.000	39.000	0.000
	143.674 - 142.619		23.42	9.190	39.000	0.236	0.00	0.000	39.000	0.000
	142.619 - 141.565		26.66	10.126	39.000	0.260	0.00	0.000	39.000	0.000
	141.565 - 140.511		29.95	11.019	39.000	0.283	0.00	0.000	39.000	0.000
	140.511 - 139.456		36.95	13.171	39.000	0.338	0.00	0.000	39.000	0.000
	139.456 - 138.402		47.13	16.286	39.000	0.418	0.00	0.000	39.000	0.000
	138.402 - 137.348		57.39	19.231	39.000	0.493	0.00	0.000	39.000	0.000
	137.348 - 136.293		67.71	22.016	39.000	0.565	0.00	0.000	39.000	0.000
	136.293 - 133.71		37.09	11.221	39.000	0.288	0.00	0.000	39.000	0.000
L2	136.293 - 133.71	TP21.855x15.696x0.313	56.18	10.944	39.000	0.281	0.00	0.000	39.000	0.000
	133.71 - 132.383		106.55	20.005	39.000	0.513	0.00	0.000	39.000	0.000
	132.383 - 131.056		119.94	21.718	39.000	0.557	0.00	0.000	39.000	0.000
	131.056 - 129.729		134.59	23.520	39.000	0.603	0.00	0.000	39.000	0.000
	129.729 - 128.403		153.85	25.963	39.000	0.666	0.00	0.000	39.000	0.000
	128.403 - 127.076		173.21	28.244	39.000	0.724	0.00	0.000	39.000	0.000
	127.076 - 125.749		192.68	30.376	39.000	0.779	0.00	0.000	39.000	0.000
	125.749 - 124.422		212.26	32.370	39.000	0.830	0.00	0.000	39.000	0.000
	124.422 - 123.095		231.94	34.235	39.000	0.878	0.00	0.000	39.000	0.000
	123.095 - 121.768		251.74	35.982	39.000	0.923	0.00	0.000	39.000	0.000
	121.768 -		271.64	37.618	39.000	0.965	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	120.442									
	120.442 - 119.115		291.65	39.151	39.000	1.004	0.00	0.000	39.000	0.000
	119.115 - 117.788		311.77	40.589	39.000	1.041	0.00	0.000	39.000	0.000
	117.788 - 116.461		332.00	41.937	39.000	1.075	0.00	0.000	39.000	0.000
	116.461 - 115.134		352.34	43.202	39.000	1.108	0.00	0.000	39.000	0.000
	115.134 - 113.807		372.79	44.390	39.000	1.138	0.00	0.000	39.000	0.000
	113.807 - 112.481		393.35	45.505	39.000	1.167	0.00	0.000	39.000	0.000
	112.481 - 111.154		414.03	46.553	39.000	1.194	0.00	0.000	39.000	0.000
	111.154 - 109.827		434.82	47.537	39.000	1.219	0.00	0.000	39.000	0.000
	109.827 - 108.5		455.73	48.462	39.000	1.243	0.00	0.000	39.000	0.000
L3	108.5 - 107.464	TP26.38x21.855x0.511	472.17	30.892	39.000	0.792	0.00	0.000	39.000	0.000
	107.464 - 106.427		488.68	31.295	39.000	0.802	0.00	0.000	39.000	0.000
	106.427 - 105.391		505.28	31.679	39.000	0.812	0.00	0.000	39.000	0.000
	105.391 - 104.354		521.95	32.046	39.000	0.822	0.00	0.000	39.000	0.000
	104.354 - 103.318		538.71	32.395	39.000	0.831	0.00	0.000	39.000	0.000
	103.318 - 102.281		555.54	32.728	39.000	0.839	0.00	0.000	39.000	0.000
	102.281 - 101.245		572.46	33.045	39.000	0.847	0.00	0.000	39.000	0.000
	101.245 - 100.208		589.46	33.348	39.000	0.855	0.00	0.000	39.000	0.000
	100.208 - 99.1719		606.53	33.638	39.000	0.863	0.00	0.000	39.000	0.000
	99.1719 - 98.1354		623.69	33.913	39.000	0.870	0.00	0.000	39.000	0.000
	98.1354 - 97.099		640.94	34.176	39.000	0.876	0.00	0.000	39.000	0.000
	97.099 - 96.0625		658.26	34.428	39.000	0.883	0.00	0.000	39.000	0.000
	96.0625 - 95.026		675.67	34.667	39.000	0.889	0.00	0.000	39.000	0.000
	95.026 - 93.9896		693.16	34.896	39.000	0.895	0.00	0.000	39.000	0.000
	93.9896 - 92.9531		710.74	35.114	39.000	0.900	0.00	0.000	39.000	0.000
	92.9531 - 91.9167		728.40	35.322	39.000	0.906	0.00	0.000	39.000	0.000
	91.9167 - 88.0833		393.75	17.849	39.000	0.458	0.00	0.000	39.000	0.000
L4	91.9167 - 88.0833	TP26.879x24.905x0.564	400.82	17.400	39.000	0.446	0.00	0.000	39.000	0.000
	88.0833 - 87.0667		812.34	34.635	39.000	0.888	0.00	0.000	39.000	0.000
	87.0667 - 86.05		830.19	34.771	39.000	0.892	0.00	0.000	39.000	0.000
	86.05 -		848.12	34.900	39.000	0.895	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	85.0333									
	85.0333 - 84.0167		866.12	35.022	39.000	0.898	0.00	0.000	39.000	0.000
	84.0167 - 83		884.21	35.139	39.000	0.901	0.00	0.000	39.000	0.000
L5	83 - 82	TP31.304x26.879x0.587	902.06	33.956	39.000	0.871	0.00	0.000	39.000	0.000
	82 - 81		919.98	34.054	39.000	0.873	0.00	0.000	39.000	0.000
	81 - 80		937.98	34.147	39.000	0.876	0.00	0.000	39.000	0.000
	80 - 79		956.21	34.240	39.000	0.878	0.00	0.000	39.000	0.000
	79 - 78		974.41	34.324	39.000	0.880	0.00	0.000	39.000	0.000
	78 - 77		992.68	34.404	39.000	0.882	0.00	0.000	39.000	0.000
	77 - 76		1011.03	34.480	39.000	0.884	0.00	0.000	39.000	0.000
	76 - 75		1029.47	34.551	39.000	0.886	0.00	0.000	39.000	0.000
	75 - 74		1047.97	34.618	39.000	0.888	0.00	0.000	39.000	0.000
	74 - 73		1066.55	34.682	39.000	0.889	0.00	0.000	39.000	0.000
	73 - 72		1085.21	34.742	39.000	0.891	0.00	0.000	39.000	0.000
	72 - 71		1103.95	34.798	39.000	0.892	0.00	0.000	39.000	0.000
	71 - 70		1122.76	34.851	39.000	0.894	0.00	0.000	39.000	0.000
	70 - 69		1141.65	34.900	39.000	0.895	0.00	0.000	39.000	0.000
	69 - 68		1160.63	34.947	39.000	0.896	0.00	0.000	39.000	0.000
	68 - 67		1179.68	34.990	39.000	0.897	0.00	0.000	39.000	0.000
	67 - 66		1198.80	35.031	39.000	0.898	0.00	0.000	39.000	0.000
	66 - 65		1218.01	35.069	39.000	0.899	0.00	0.000	39.000	0.000
	65 - 64		1237.30	35.104	39.000	0.900	0.00	0.000	39.000	0.000
	64 - 63		1256.67	35.137	39.000	0.901	0.00	0.000	39.000	0.000
L6	63 - 61.964	TP35.62x31.304x0.564	1276.82	36.541	39.000	0.937	0.00	0.000	39.000	0.000
	61.964 - 60.9281		1297.03	36.572	39.000	0.938	0.00	0.000	39.000	0.000
	60.9281 - 59.8921		1317.33	36.599	39.000	0.938	0.00	0.000	39.000	0.000
	59.8921 - 58.8562		1337.70	36.624	39.000	0.939	0.00	0.000	39.000	0.000
	58.8562 - 57.8202		1358.15	36.647	39.000	0.940	0.00	0.000	39.000	0.000
	57.8202 - 56.7843		1378.68	36.667	39.000	0.940	0.00	0.000	39.000	0.000
	56.7843 - 55.7483		1399.28	36.685	39.000	0.941	0.00	0.000	39.000	0.000
	55.7483 - 54.7124		1419.97	36.700	39.000	0.941	0.00	0.000	39.000	0.000
	54.7124 - 53.6764		1440.72	36.714	39.000	0.941	0.00	0.000	39.000	0.000
	53.6764 - 52.6405		1461.57	36.725	39.000	0.942	0.00	0.000	39.000	0.000
	52.6405 - 51.6045		1482.48	36.735	39.000	0.942	0.00	0.000	39.000	0.000
	51.6045 - 50.5686		1503.47	36.743	39.000	0.942	0.00	0.000	39.000	0.000
	50.5686 - 49.5326		1524.55	36.749	39.000	0.942	0.00	0.000	39.000	0.000
	49.5326 - 48.4967		1545.70	36.753	39.000	0.942	0.00	0.000	39.000	0.000
	48.4967 - 43.4967		862.94	19.234	39.000	0.493	0.00	0.000	39.000	0.000
L7	48.4967 - 43.4967	TP37.194x33.764x0.548	736.87	18.831	39.000	0.483	0.00	0.000	39.000	0.000
	43.4967 - 42.447		1649.11	39.450	39.000	1.012	0.00	0.000	39.000	0.000
	42.447 - 41.3973		1671.08	39.435	39.000	1.011	0.00	0.000	39.000	0.000
	41.3973 -		1693.13	39.419	39.000	1.011	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	40.3477									
	40.3477 - 39.298		1715.24	39.402	39.000	1.010	0.00	0.000	39.000	0.000
	39.298 - 38.2483		1737.43	39.383	39.000	1.010	0.00	0.000	39.000	0.000
	38.2483 - 37.1987		1759.69	39.363	39.000	1.009	0.00	0.000	39.000	0.000
	37.1987 - 36.149		1782.02	39.342	39.000	1.009	0.00	0.000	39.000	0.000
	36.149 - 35.0993		1804.42	39.319	39.000	1.008	0.00	0.000	39.000	0.000
	35.0993 - 34.0497		1826.89	39.295	39.000	1.008	0.00	0.000	39.000	0.000
	34.0497 - 33		1849.43	39.270	39.000	1.007	0.00	0.000	39.000	0.000
L8	33 - 32 (8)	TP37.416x37.194x0.597	1872.05	36.183	39.000	0.928	0.00	0.000	39.000	0.000
L9	32 - 31	TP38.301x37.416x0.488	1893.65	43.853	39.000	1.124	0.00	0.000	39.000	0.000
	31 - 30		1915.33	43.825	39.000	1.124	0.00	0.000	39.000	0.000
	30 - 29		1937.06	43.795	39.000	1.123	0.00	0.000	39.000	0.000
	29 - 28		1958.86	43.764	39.000	1.122	0.00	0.000	39.000	0.000
L10	28 - 26.6	TP44.5x38.301x0.47	1980.72	45.344	39.000	1.163	0.00	0.000	39.000	0.000
	26.6 - 25.2		2011.44	45.297	39.000	1.161	0.00	0.000	39.000	0.000
	25.2 - 23.8		2042.28	45.249	39.000	1.160	0.00	0.000	39.000	0.000
	23.8 - 22.4		2073.24	45.199	39.000	1.159	0.00	0.000	39.000	0.000
	22.4 - 21		2104.31	45.147	39.000	1.158	0.00	0.000	39.000	0.000
	21 - 19.6		2135.49	45.093	39.000	1.156	0.00	0.000	39.000	0.000
	19.6 - 18.2		2166.79	45.038	39.000	1.155	0.00	0.000	39.000	0.000
	18.2 - 16.8		2198.21	44.982	39.000	1.153	0.00	0.000	39.000	0.000
	16.8 - 15.4		2229.73	44.924	39.000	1.152	0.00	0.000	39.000	0.000
	15.4 - 14		2261.38	44.865	39.000	1.150	0.00	0.000	39.000	0.000
	14 - 12.6		2293.15	44.805	39.000	1.149	0.00	0.000	39.000	0.000
	12.6 - 11.2		2325.03	44.744	39.000	1.147	0.00	0.000	39.000	0.000
	11.2 - 9.8		2357.03	44.682	39.000	1.146	0.00	0.000	39.000	0.000
	9.8 - 8.4		2389.14	44.619	39.000	1.144	0.00	0.000	39.000	0.000
	8.4 - 7		2421.38	44.555	39.000	1.142	0.00	0.000	39.000	0.000
	7 - 5.6		2453.72	44.490	39.000	1.141	0.00	0.000	39.000	0.000
	5.6 - 4.2		2486.19	44.425	39.000	1.139	0.00	0.000	39.000	0.000
	4.2 - 2.8		2518.78	44.358	39.000	1.137	0.00	0.000	39.000	0.000
	2.8 - 1.4		2551.49	44.292	39.000	1.136	0.00	0.000	39.000	0.000
	1.4 - 0		2584.32	44.224	39.000	1.134	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	150 - 148.946	TP16.65x13x0.188	2.75	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	148.946 - 147.891		2.80	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	147.891 - 146.837		2.84	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	146.837 - 145.783		2.89	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	145.783 - 144.728		2.94	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	144.728 - 143.674		3.00	0.354	26.000	0.027	0.00	0.000	26.000	0.000

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 $\frac{f_{vt}}{F_{vt}}$
	143.674 - 142.619		3.05	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	142.619 - 141.565		3.10	0.354	26.000	0.027	0.00	0.000	26.000	0.000
	141.565 - 140.511		3.15	0.355	26.000	0.027	0.00	0.000	26.000	0.000
	140.511 - 139.456		9.47	1.048	26.000	0.081	1.33	0.231	26.000	0.009
	139.456 - 138.402		9.65	1.052	26.000	0.081	0.76	0.128	26.000	0.005
	138.402 - 137.348		9.76	1.049	26.000	0.081	0.01	0.001	26.000	0.000
	137.348 - 136.293		9.82	1.039	26.000	0.080	0.01	0.001	26.000	0.000
	136.293 - 133.71		4.01	0.409	26.000	0.031	0.00	0.001	26.000	0.000
L2	136.293 - 133.71	TP21.855x15.696x0.313	5.97	0.377	26.000	0.029	0.01	0.000	26.000	0.000
	133.71 - 132.383		10.06	0.624	26.000	0.048	0.01	0.001	26.000	0.000
	132.383 - 131.056		10.14	0.618	26.000	0.048	0.01	0.001	26.000	0.000
	131.056 - 129.729		14.48	0.867	26.000	0.067	0.41	0.034	26.000	0.001
	129.729 - 128.403		14.56	0.857	26.000	0.066	0.41	0.033	26.000	0.001
	128.403 - 127.076		14.64	0.847	26.000	0.065	0.41	0.032	26.000	0.001
	127.076 - 125.749		14.72	0.837	26.000	0.064	0.41	0.031	26.000	0.001
	125.749 - 124.422		14.80	0.828	26.000	0.064	0.40	0.030	26.000	0.001
	124.422 - 123.095		14.88	0.819	26.000	0.063	0.40	0.029	26.000	0.001
	123.095 - 121.768		14.96	0.811	26.000	0.062	0.40	0.028	26.000	0.001
	121.768 - 120.442		15.04	0.803	26.000	0.062	0.40	0.027	26.000	0.001
	120.442 - 119.115		15.13	0.795	26.000	0.061	0.40	0.026	26.000	0.001
	119.115 - 117.788		15.21	0.787	26.000	0.061	0.40	0.025	26.000	0.001
	117.788 - 116.461		15.29	0.780	26.000	0.060	0.40	0.024	26.000	0.001
	116.461 - 115.134		15.38	0.772	26.000	0.059	0.40	0.024	26.000	0.001
	115.134 - 113.807		15.46	0.765	26.000	0.059	0.40	0.023	26.000	0.001
	113.807 - 112.481		15.55	0.759	26.000	0.058	0.40	0.022	26.000	0.001
	112.481 - 111.154		15.63	0.752	26.000	0.058	0.39	0.022	26.000	0.001
	111.154 - 109.827		15.72	0.746	26.000	0.057	0.39	0.021	26.000	0.001
	109.827 - 108.5		15.81	0.740	26.000	0.057	0.39	0.020	26.000	0.001
L3	108.5 - 107.464	TP26.38x21.855x0.511	15.88	0.454	26.000	0.035	0.39	0.012	26.000	0.000
	107.464 - 106.427		15.95	0.451	26.000	0.035	0.39	0.012	26.000	0.000

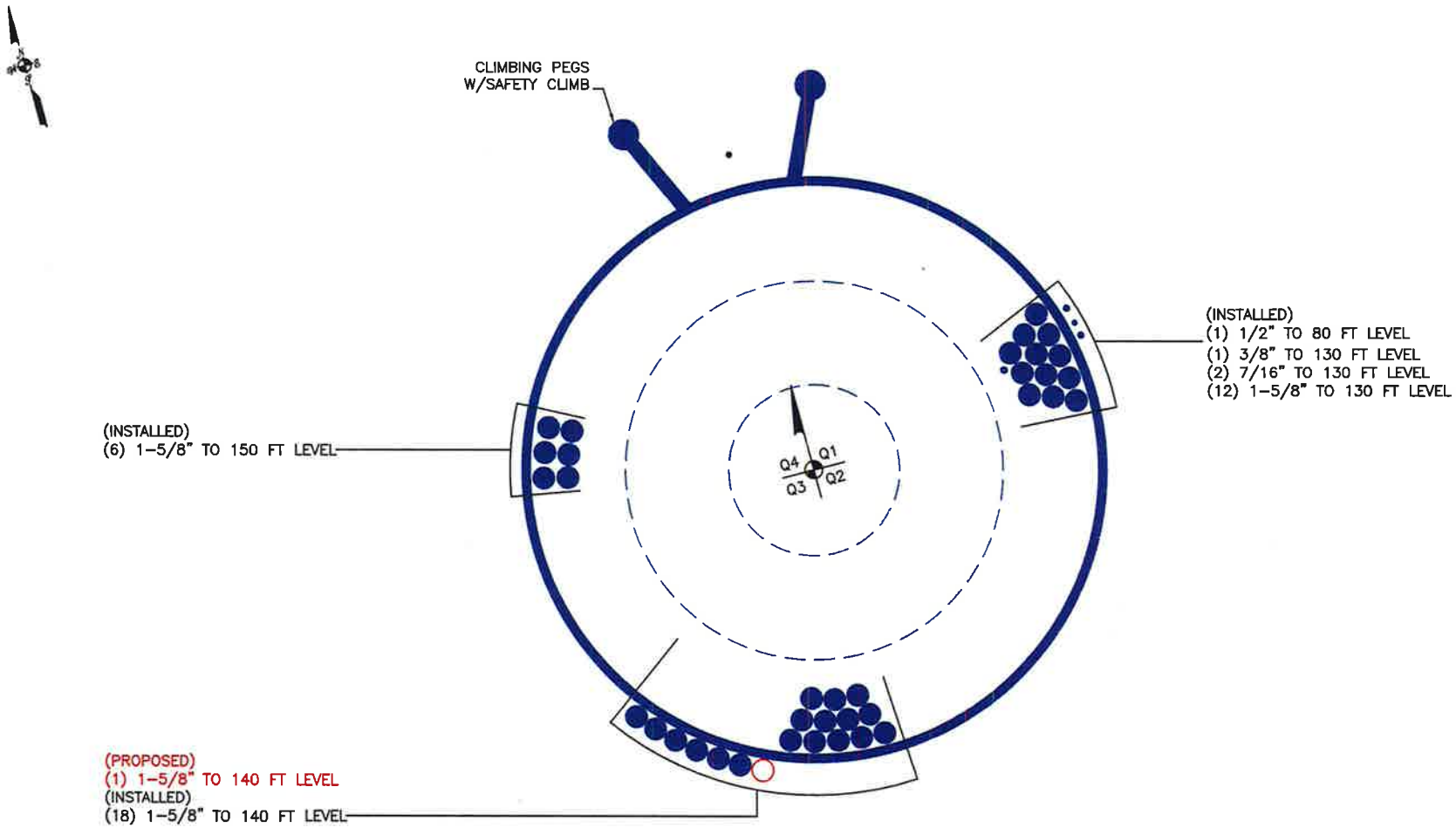
Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	106.427 - 105.391		16.03	0.449	26.000	0.034	0.39	0.012	26.000	0.000
	105.391 - 104.354		16.11	0.446	26.000	0.034	0.39	0.012	26.000	0.000
	104.354 - 103.318		16.18	0.444	26.000	0.034	0.39	0.011	26.000	0.000
	103.318 - 102.281		16.26	0.441	26.000	0.034	0.39	0.011	26.000	0.000
	102.281 - 101.245		16.34	0.439	26.000	0.034	0.39	0.011	26.000	0.000
	101.245 - 100.208		16.42	0.437	26.000	0.034	0.39	0.011	26.000	0.000
	100.208 - 99.1719		16.50	0.434	26.000	0.033	0.39	0.011	26.000	0.000
	99.1719 - 98.1354		16.58	0.432	26.000	0.033	0.39	0.010	26.000	0.000
	98.1354 - 97.099		16.66	0.430	26.000	0.033	0.39	0.010	26.000	0.000
	97.099 - 96.0625		16.74	0.428	26.000	0.033	0.39	0.010	26.000	0.000
	96.0625 - 95.026		16.82	0.426	26.000	0.033	0.39	0.010	26.000	0.000
	95.026 - 93.9896		16.90	0.424	26.000	0.033	0.39	0.010	26.000	0.000
	93.9896 - 92.9531		16.98	0.422	26.000	0.032	0.40	0.009	26.000	0.000
	92.9531 - 91.9167		17.06	0.420	26.000	0.032	0.40	0.009	26.000	0.000
	91.9167 - 88.0833		8.71	0.208	26.000	0.016	0.20	0.004	26.000	0.000
L4	91.9167 - 88.0833	TP26.879x24.905x0.564	8.72	0.193	26.000	0.015	0.20	0.004	26.000	0.000
	88.0833 - 87.0667		17.50	0.385	26.000	0.030	0.40	0.008	26.000	0.000
	87.0667 - 86.05		17.58	0.383	26.000	0.029	0.40	0.008	26.000	0.000
	86.05 - 85.0333		17.66	0.381	26.000	0.029	0.40	0.008	26.000	0.000
	85.0333 - 84.0167		17.74	0.380	26.000	0.029	0.40	0.008	26.000	0.000
	84.0167 - 83		17.82	0.378	26.000	0.029	0.40	0.008	26.000	0.000
L5	83 - 82	TP31.304x26.879x0.587	17.89	0.362	26.000	0.028	0.40	0.007	26.000	0.000
	82 - 81		17.97	0.361	26.000	0.028	0.40	0.007	26.000	0.000
	81 - 80		18.04	0.359	26.000	0.028	0.40	0.007	26.000	0.000
	80 - 79		18.17	0.359	26.000	0.028	0.26	0.004	26.000	0.000
	79 - 78		18.24	0.357	26.000	0.027	0.26	0.004	26.000	0.000
	78 - 77		18.32	0.356	26.000	0.027	0.26	0.004	26.000	0.000
	77 - 76		18.39	0.354	26.000	0.027	0.26	0.004	26.000	0.000
	76 - 75		18.47	0.353	26.000	0.027	0.26	0.004	26.000	0.000
	75 - 74		18.55	0.352	26.000	0.027	0.26	0.004	26.000	0.000
	74 - 73		18.62	0.351	26.000	0.027	0.26	0.004	26.000	0.000
	73 - 72		18.70	0.349	26.000	0.027	0.26	0.004	26.000	0.000
	72 - 71		18.78	0.348	26.000	0.027	0.26	0.004	26.000	0.000
	71 - 70		18.86	0.347	26.000	0.027	0.26	0.004	26.000	0.000
	70 - 69		18.94	0.346	26.000	0.027	0.26	0.004	26.000	0.000
	69 - 68		19.02	0.345	26.000	0.026	0.26	0.004	26.000	0.000
	68 - 67		19.09	0.343	26.000	0.026	0.26	0.004	26.000	0.000
	67 - 66		19.17	0.342	26.000	0.026	0.26	0.004	26.000	0.000
	66 - 65		19.25	0.341	26.000	0.026	0.26	0.004	26.000	0.000
	65 - 64		19.33	0.340	26.000	0.026	0.26	0.004	26.000	0.000

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 $\frac{f_{vt}}{F_{vt}}$
	64 - 63		19.41	0.339	26.000	0.026	0.26	0.004	26.000	0.000
L6	63 - 61.964	TP35.62x31.304x0.564	19.49	0.352	26.000	0.027	0.26	0.004	26.000	0.000
	61.964 - 60.9281		19.56	0.350	26.000	0.027	0.26	0.004	26.000	0.000
	60.9281 - 59.8921		19.63	0.349	26.000	0.027	0.26	0.004	26.000	0.000
	59.8921 - 58.8562		19.71	0.348	26.000	0.027	0.26	0.003	26.000	0.000
	58.8562 - 57.8202		19.78	0.347	26.000	0.027	0.26	0.003	26.000	0.000
	57.8202 - 56.7843		19.86	0.345	26.000	0.027	0.26	0.003	26.000	0.000
	56.7843 - 55.7483		19.93	0.344	26.000	0.026	0.26	0.003	26.000	0.000
	55.7483 - 54.7124		20.01	0.343	26.000	0.026	0.26	0.003	26.000	0.000
	54.7124 - 53.6764		20.08	0.342	26.000	0.026	0.26	0.003	26.000	0.000
	53.6764 - 52.6405		20.16	0.341	26.000	0.026	0.27	0.003	26.000	0.000
	52.6405 - 51.6045		20.23	0.340	26.000	0.026	0.27	0.003	26.000	0.000
	51.6045 - 50.5686		20.31	0.339	26.000	0.026	0.27	0.003	26.000	0.000
	50.5686 - 49.5326		20.39	0.338	26.000	0.026	0.27	0.003	26.000	0.000
	49.5326 - 48.4967		20.46	0.337	26.000	0.026	0.27	0.003	26.000	0.000
	48.4967 - 43.4967		11.05	0.176	26.000	0.014	0.14	0.002	26.000	0.000
L7	48.4967 - 43.4967	TP37.194x33.764x0.548	9.87	0.171	26.000	0.013	0.13	0.002	26.000	0.000
	43.4967 - 42.447		20.98	0.351	26.000	0.027	0.27	0.003	26.000	0.000
	42.447 - 41.3973		21.05	0.350	26.000	0.027	0.27	0.003	26.000	0.000
	41.3973 - 40.3477		21.11	0.349	26.000	0.027	0.27	0.003	26.000	0.000
	40.3477 - 39.298		21.18	0.348	26.000	0.027	0.27	0.003	26.000	0.000
	39.298 - 38.2483		21.25	0.346	26.000	0.026	0.27	0.003	26.000	0.000
	38.2483 - 37.1987		21.32	0.345	26.000	0.026	0.27	0.003	26.000	0.000
	37.1987 - 36.149		21.38	0.344	26.000	0.026	0.27	0.003	26.000	0.000
	36.149 - 35.0993		21.45	0.343	26.000	0.026	0.27	0.003	26.000	0.000
	35.0993 - 34.0497		21.52	0.342	26.000	0.026	0.27	0.003	26.000	0.000
	34.0497 - 33		21.59	0.341	26.000	0.026	0.27	0.003	26.000	0.000
L8	33 - 32 (8)	TP37.416x37.194x0.597	21.65	0.312	26.000	0.024	0.27	0.003	26.000	0.000
L9	32 - 31	TP38.301x37.416x0.488	21.72	0.380	26.000	0.029	0.27	0.003	26.000	0.000
	31 - 30		21.78	0.379	26.000	0.029	0.27	0.003	26.000	0.000
	30 - 29		21.84	0.377	26.000	0.029	0.27	0.003	26.000	0.000
	29 - 28		21.90	0.376	26.000	0.029	0.27	0.003	26.000	0.000
L10	28 - 26.6	TP44.5x38.301x0.47	21.98	0.390	26.000	0.030	0.27	0.003	26.000	0.000
	26.6 - 25.2		22.07	0.388	26.000	0.030	0.27	0.003	26.000	0.000
	25.2 - 23.8		22.15	0.386	26.000	0.029	0.27	0.003	26.000	0.000
	23.8 - 22.4		22.23	0.385	26.000	0.029	0.27	0.003	26.000	0.000

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 $\frac{f_{vt}}{F_{vt}}$
	22.4 - 21		22.31	0.383	26.000	0.029	0.27	0.003	26.000	0.000
	21 - 19.6		22.39	0.381	26.000	0.029	0.27	0.003	26.000	0.000
	19.6 - 18.2		22.48	0.380	26.000	0.029	0.28	0.003	26.000	0.000
	18.2 - 16.8		22.56	0.378	26.000	0.029	0.28	0.003	26.000	0.000
	16.8 - 15.4		22.64	0.377	26.000	0.029	0.28	0.003	26.000	0.000
	15.4 - 14		22.73	0.375	26.000	0.029	0.28	0.003	26.000	0.000
	14 - 12.6		22.81	0.374	26.000	0.029	0.28	0.003	26.000	0.000
	12.6 - 11.2		22.89	0.372	26.000	0.028	0.28	0.003	26.000	0.000
	11.2 - 9.8		22.98	0.371	26.000	0.028	0.28	0.003	26.000	0.000
	9.8 - 8.4		23.06	0.370	26.000	0.028	0.28	0.003	26.000	0.000
	8.4 - 7		23.15	0.368	26.000	0.028	0.28	0.002	26.000	0.000
	7 - 5.6		23.23	0.367	26.000	0.028	0.28	0.002	26.000	0.000
	5.6 - 4.2		23.32	0.365	26.000	0.028	0.28	0.002	26.000	0.000
	4.2 - 2.8		23.40	0.364	26.000	0.028	0.28	0.002	26.000	0.000
	2.8 - 1.4		23.49	0.363	26.000	0.028	0.28	0.002	26.000	0.000
	1.4 - 0		23.58	0.362	26.000	0.028	0.28	0.002	26.000	0.000

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876384 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Pole (L2)	93.9%	Pass
Mod (M3b)	95.3%	Pass

Westbrook / Orsina (BU 876384)
TEP #: 25589.31758
Analysis: GJS 4/24/2015
Check: JLK 4/24/2015

Monopole Reinforcement_v1.4.8 - TIA-222-F

Mod #	Modification Type	Termination Length (ft)	Bot. Elevation (ft)	Top Elevation (ft)	Termination Length (ft)	Modification Location (° or Flat/Point #)	Location (F/P)	Lateral Offset (in)
1	CCI-WSFP-060100	0.00	0.00	35.00		10 16	Flats	0.00
2	CCI-WSFP-060100	0.00	0.00	30.00		1 7	Flats	0.00
3a	CCI-SFP-060100		30.00	65.00		13	Flats	0.00
3b	CCI-SFP-060100	-2.00	30.00	65.00		1 7	Flats	0.00
4	CCI-SFP-060100	-2.00	65.00	85.00		1 7 13	Flats	0.00
5	CCI-SFP-045100	-2.00	85.00	110.00		1 7 13	Flats	0.00

MODIFICATION PROPERTIES

#	Modification	Default Termination (ft)	Stitch (in)	k	Drill Hole (in)	Bolt/Weld Capacity (k)	A_G (in^2)	F_Y (ksi)	F_U (ksi)
1	CCI-WSFP-060100	2.00	16.00	0.80	1.1875	30.0	6.00	65.0	80.0
3	CCI-SFP-060100	2.00	16.00	0.80	1.1875	30.0	6.00	65.0	80.0
5	CCI-SFP-045100	1.50	20.00	0.80	1.1875	30.0	4.50	65.0	80.0

Tower Engineering Professionals, Inc.
326 Tryon Road | Raleigh, NC 27603-3530 | Office: (919) 661-6351 | Fax: (919) 661-6350 | www.tepgroup.net

Pole (L2)	93.9%	Pass
Mod (M3b)	95.3%	Pass

Westbrook / Orsina (BU 876384)
TEP #: 25589.31758
Analysis: GJS 4/24/2015
Check: JLK 4/24/2015

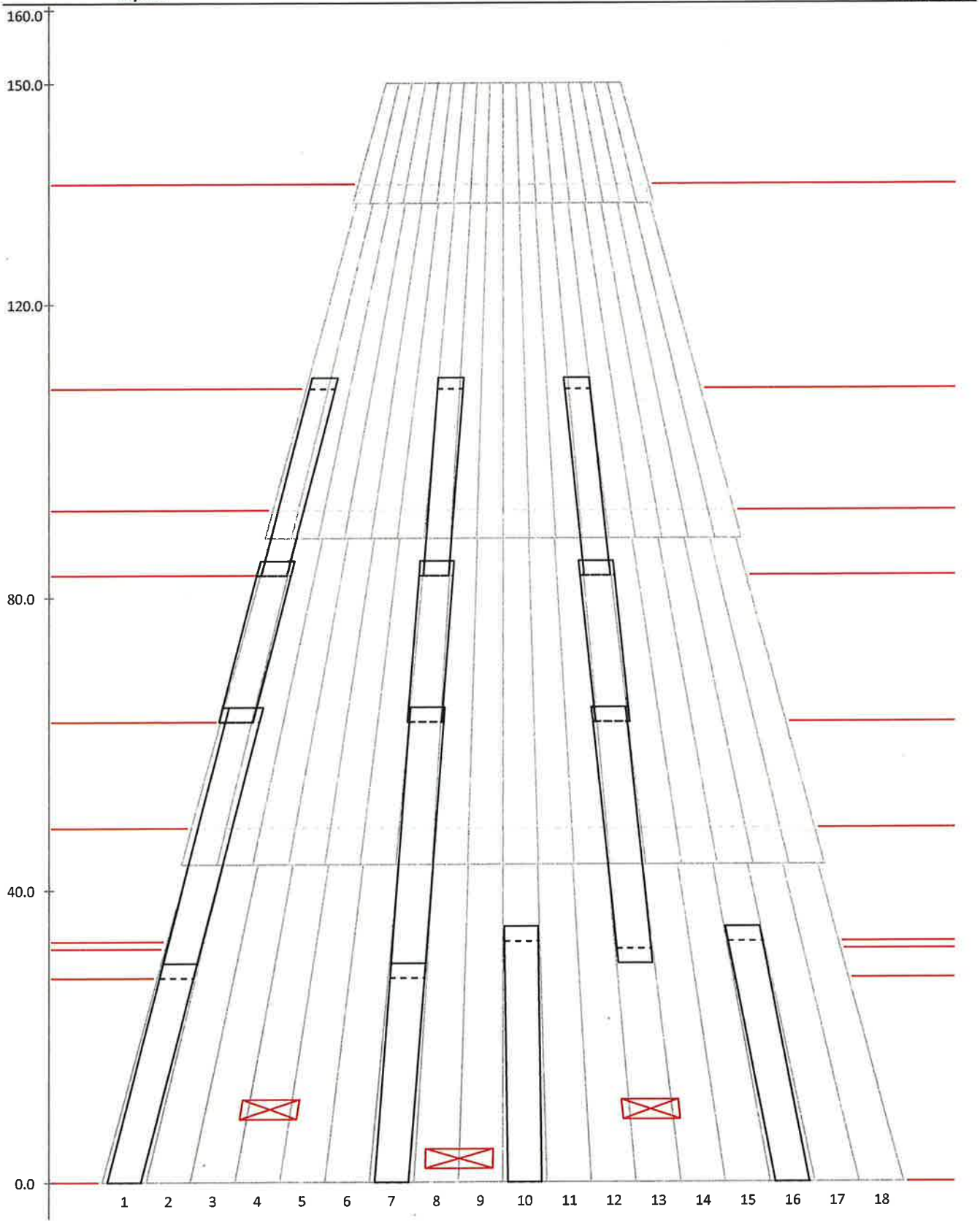
Monopole Reinforcement_v1.4.8 - TIA-222-F - Capacities

Section No.	*Elevation (ft)*	*Type*	*Size*	*Critical Element*	*P (k)*	*Pa (k)*	*% Capacity*	*Pass/Fail*
L1	150.00-133.71	Pole	TP16.65×13.00×0.1875	1	Note 1	Note 1	43.0	Pass
L2	136.29-88.08	Pole	TP26.38×15.70×0.3125	2	Note 1	Note 1	93.9	Pass
L3	91.92-43.50	Pole	TP35.62×24.91×0.3750	3	Note 1	Note 1	71.4	Pass
L4	48.50-0.00	Pole	TP44.50×33.76×0.3750	4	Note 1	Note 1	85.2	Pass
M1	35.00-0.00	Mod (Pr)	CCI-WSFP-060100	1	Note 1	Note 1	86.8	Pass
M2	30.00-0.00	Mod (Pr)	CCI-WSFP-060100	2	Note 1	Note 1	86.8	Pass
M3b	65.00-30.00	Mod (Pr)	CCI-SFP-060100	3	Note 1	Note 1	95.3	Pass
M4	85.00-65.00	Mod (Pr)	CCI-SFP-060100	4	Note 1	Note 1	85.6	Pass
M5	110.00-85.00	Mod (Pr)	CCI-SFP-045100	5	Note 1	Note 1	94.8	Pass

	Summary	
Pole (L2)	93.9	Pass
Mod (M3b)	95.3	Pass
RATING =	**95.3**	**Pass**

*Note 1: See additional documentation in following sheets for details.

Reinforcement Layout



Elevation: 0.00-ft

Loads	
Axial:	35.3 k
Moment:	2,617.1 k·ft
Shear:	23.6 k
Torsion:	0.3 k·ft

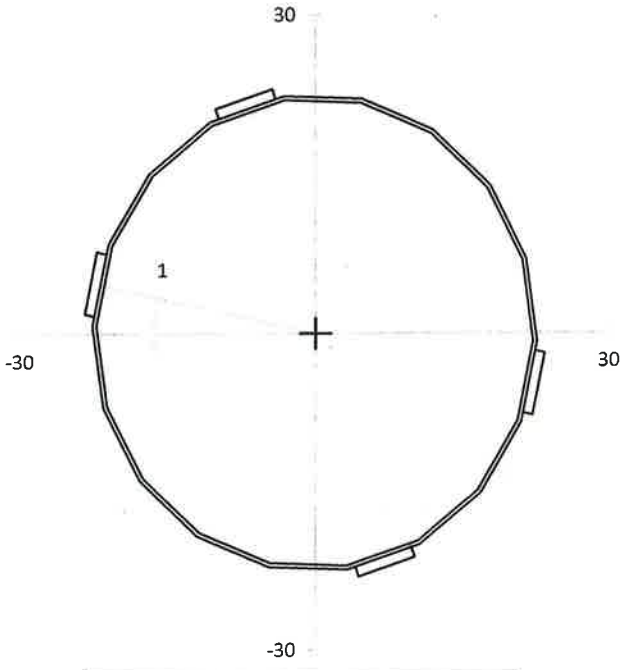
Equivalent Loads to Pole	
Axial:	24.3 k
Moment:	2,094.8 k·ft
Shear:	16.2 k
Torsion:	0.3 k·ft

Shear Flow	
Controlling Mod:	1
q:	0.162 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	184.73 in
Stitch:	16.00 in
Capacity:	8.7%

Pole Info	
OD:	44.50 in
t:	0.3750 in
Pole A_G:	52.52 in²
Pole I_G:	12,919.0 in⁴

Controlling	
Angle:	281.95°
I_{CONT}:	18,838.6 in⁴
A_G:	76.52 in²

Minimum	
Angle:	60.00°
I_{MIN}:	16,078.9 in⁴
t_{EFF}:	0.4697 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in⁴)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
245.70	22.54	16139.8	0.462	43.863	52.000	52.000	85.2%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	$\bar{y}_{CONT}$ (in)	I (in⁴)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
1	1	198.05	21.63	18838.6	0.462	36.059	42.057	42.222	86.8%
1	2	281.95	21.63	18838.6	0.462	36.059	42.057	42.222	86.8%
2	1	18.05	21.63	18838.6	0.462	36.059	42.057	42.222	86.8%
2	2	101.95	21.63	18838.6	0.462	36.059	42.057	42.222	86.8%

Elevation: 28.00-ft

Loads	
Axial:	27.0 k
Moment:	1,980.6 k·ft
Shear:	21.9 k
Torsion:	0.3 k·ft

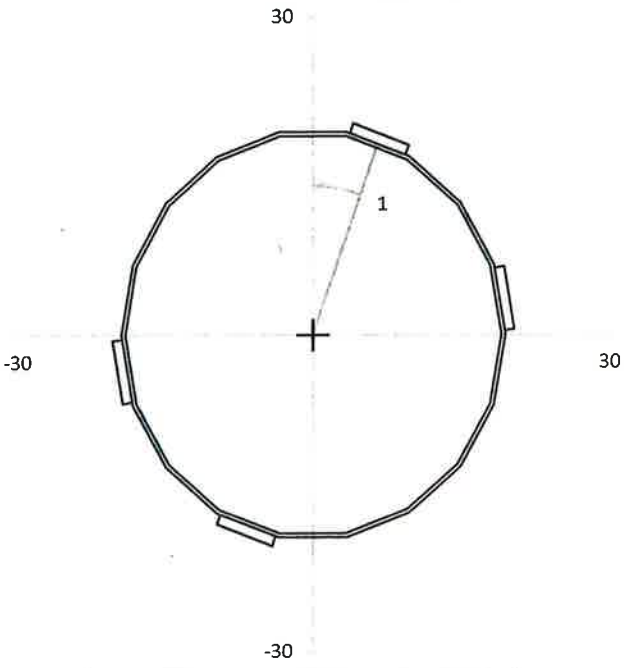
Equivalent Loads to Pole	
Axial:	17.6 k
Moment:	1,530.5 k·ft
Shear:	14.3 k
Torsion:	0.3 k·ft

Shear Flow	
Controlling Mod:	4
q:	0.194 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	154.27 in
Stitch:	16.00 in
Capacity:	10.4%

Pole Info	
OD:	38.30 in
t:	0.3750 in
Pole A_G:	45.14 in^2
Pole I_G:	8,203.4 in^4

Controlling	
Angle:	19.95°
I_G:	12,478.8 in^4
A_G:	69.14 in^2

Minimum	
Angle:	60.00°
I_{MIN}:	10,574.8 in^4
t_{EFF}:	0.4877 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
65.40	19.39	10615.5	0.391	43.421	52.000	52.000	84.3%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
1	1	199.95	18.47	12478.8	0.391	35.180	42.057	42.222	84.6%
1	2	280.05	18.47	12478.8	0.391	35.180	42.057	42.222	84.6%
3b	1	19.95	18.47	12478.8	0.391	35.180	42.057	42.222	84.6%
3b	2	100.05	18.47	12478.8	0.391	35.180	42.057	42.222	84.6%

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Elevation: 32.00-ft

Loads	
Axial:	25.8 k
Moment:	1,893.5 k·ft
Shear:	21.7 k
Torsion:	0.3 k·ft

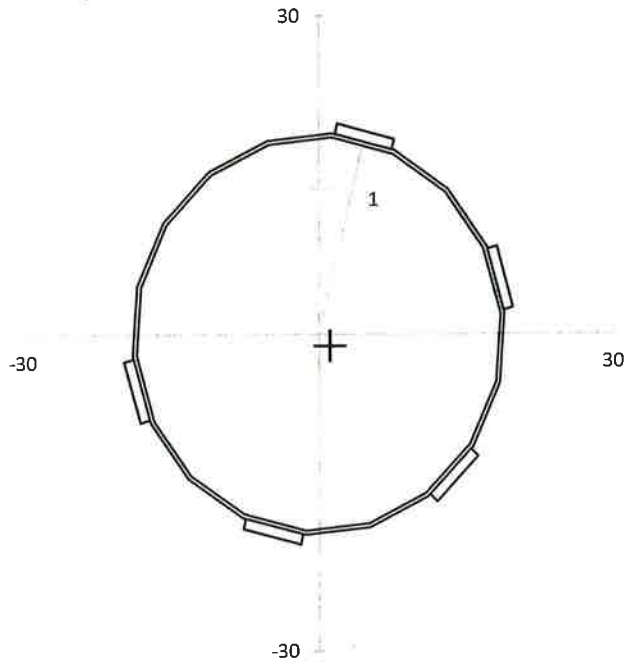
Equivalent Loads to Pole	
Axial:	15.4 k
Moment:	1,212.4 k·ft
Shear:	12.9 k
Torsion:	0.3 k·ft

Shear Flow	
Controlling Mod:	4
q:	0.194 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	154.29 in
Stitch:	16.00 in
Capacity:	10.4%

Pole Info	
OD:	37.42 in
t:	0.3750 in
Pole A_G:	44.09 in^2
Pole I_G:	7,642.1 in^4

Controlling	
Angle:	14.05°
I_G:	13,172.2 in^4
A_G:	74.09 in^2

Minimum	
Angle:	60.00°
I_{MIN}:	11,945.1 in^4
t_{EFF}:	0.5968 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
66.65	20.52	11977.0	0.349	38.929	52.000	52.000	75.5%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	$\bar{Y}_{CONT}$ (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
1	1	**185.20**	18.23	13531.3	0.349	30.616	42.057	42.222	73.6%
1	2	**294.80**	18.23	13531.3	0.349	30.616	42.057	42.222	73.6%
3a	1	**240.00**	17.65	11945.1	0.349	33.578	42.057	42.222	80.7%
3b	**1**	**14.05**	**19.71**	**13172.2**	**0.349**	**34.008**	**42.057**	**42.222**	**81.7%**
3b	2	**105.95**	19.71	13172.2	0.349	34.008	42.057	42.222	81.7%

Elevation: 33.00-ft

Loads	
Axial:	25.5 k
Moment:	1,871.9 k-ft
Shear:	21.6 k
Torsion:	0.3 k-ft

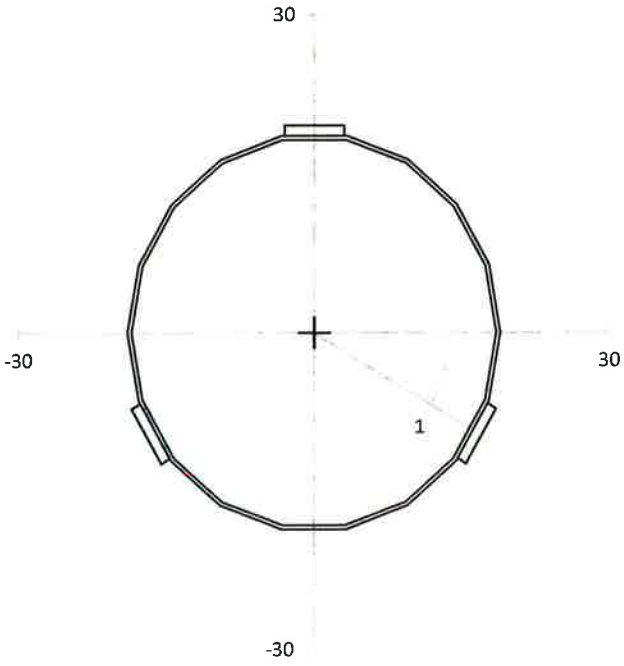
Equivalent Loads to Pole	
Axial:	18.1 k
Moment:	1,299.0 k-ft
Shear:	15.3 k
Torsion:	0.3 k-ft

Shear Flow	
Controlling Mod:	4
q:	0.229 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	131.17 in
Stitch:	16.00 in
Capacity:	12.2%

Pole Info	
OD:	37.19 in
t:	0.3750 in
Pole A_G:	43.82 in^2
Pole I_G:	7,505.9 in^4

Controlling	
Angle:	120.00°
I_G:	10,816.0 in^4
A_G:	61.82 in^2

Minimum	
Angle:	298.00°
I_{MIN}:	10,816.0 in^4
t_{EFF}:	0.5481 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	18.89	10816.0	0.413	39.241	52.000	52.000	76.3%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
3a	1	240.00	19.10	10816.0	0.413	39.661	42.057	42.222	95.3%
3b	1	0.00	19.10	10816.0	0.413	39.661	42.057	42.222	95.3%
3b	2	120.00	19.10	10816.0	0.413	39.661	42.057	42.222	95.3%

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Elevation: 48.50-ft

Loads	
Axial:	20.9 k
Moment:	1,545.7 k-ft
Shear:	20.5 k
Torsion:	0.3 k-ft

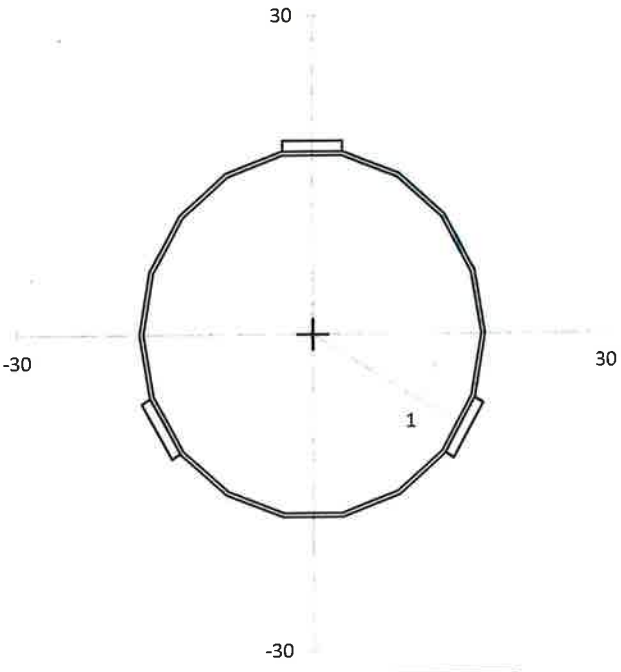
Equivalent Loads to Pole	
Axial:	14.5 k
Moment:	1,045.1 k-ft
Shear:	14.2 k
Torsion:	0.3 k-ft

Shear Flow	
Controlling Mod:	4
q:	0.246 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	121.76 in
Stitch:	16.00 in
Capacity:	13.1%

Pole Info	
OD:	34.51 in
t:	0.3750 in
Pole A_G:	40.63 in^2
Pole I_G:	5,982.9 in^4

Controlling	
Angle:	120.00°
I_G:	8,848.4 in^4
A_G:	58.63 in^2

Minimum	
Angle:	111.90°
I_{MIN}:	8,848.4 in^4
t_{EFF}:	0.5639 in



Pole Segment: L3, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
130.00	17.53	8848.4	0.357	36.752	52.000	52.000	71.4%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
3a	1	240.00	17.76	8848.4	0.357	37.222	42.057	42.222	89.4%
3b	1	360.00	17.76	8848.4	0.357	37.222	42.057	42.222	89.4%
3b	2	120.00	17.76	8848.4	0.357	37.222	42.057	42.222	89.4%

Elevation: 63.00-ft

Loads	
Axial:	17.5 k
Moment:	1,256.6 k·ft
Shear:	19.4 k
Torsion:	0.3 k·ft

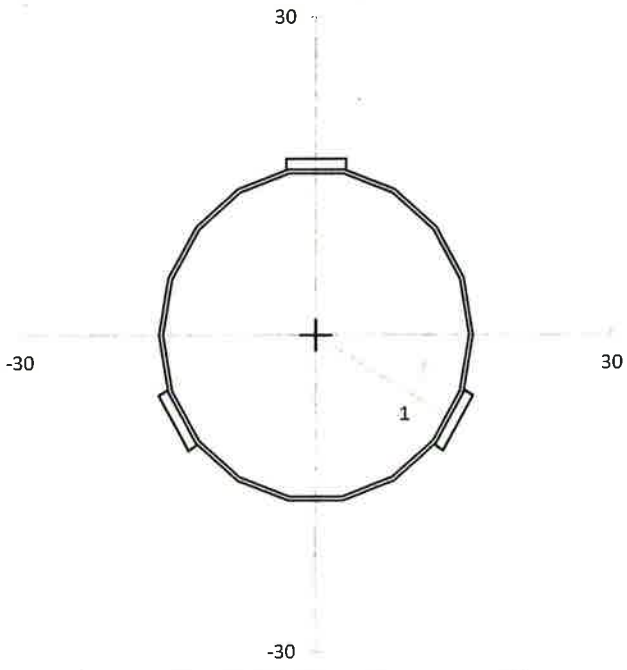
Pole Info	
OD:	31.30 in
t:	0.3750 in
Pole A_G:	36.81 in^2
Pole I_G:	4,449.2 in^4

Equivalent Loads to Pole	
Axial:	11.7 k
Moment:	819.2 k·ft
Shear:	13.0 k
Torsion:	0.3 k·ft

Controlling	
Angle:	120.00°
I_G:	6,825.0 in^4
A_G:	54.81 in^2

Shear Flow	
Controlling Mod:	5
q:	0.276 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	108.84 in
Stitch:	16.00 in
Capacity:	14.7%

Minimum	
Angle:	120.20°
I_{MIN}:	6,825.0 in^4
t_{EFF}:	0.5872 in



Pole Segment: L3, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	15.90	6825.0	0.319	35.135	52.000	52.000	68.2%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
4	1	0.00	16.15	6825.0	0.319	35.686	42.057	42.222	85.6%
4	2	120.00	16.15	6825.0	0.319	35.686	42.057	42.222	85.6%
4	3	240.00	16.15	6825.0	0.319	35.686	42.057	42.222	85.6%

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Elevation: 83.00-ft

Loads	
Axial:	13.0 k
Moment:	884.1 k-ft
Shear:	17.8 k
Torsion:	0.4 k-ft

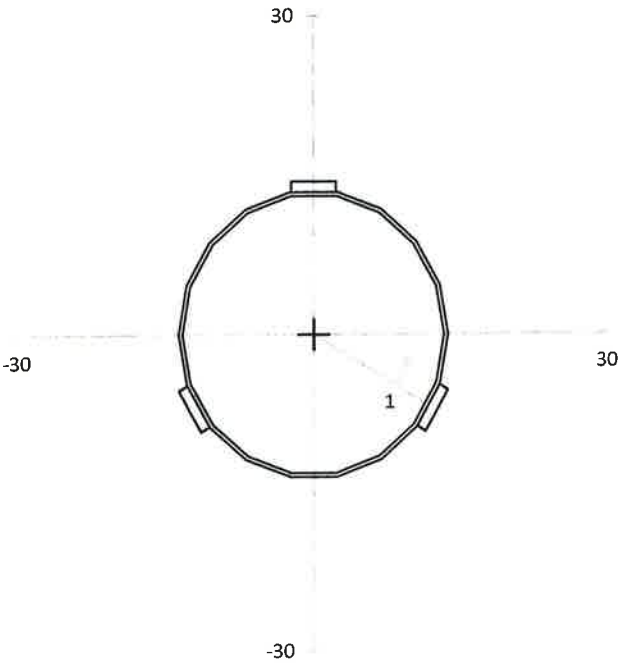
Equivalent Loads to Pole	
Axial:	9.1 k
Moment:	600.3 k-ft
Shear:	12.5 k
Torsion:	0.4 k-ft

Shear Flow	
Controlling Mod:	6
q:	0.271 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	110.68 in
Stitch:	20.00 in
Capacity:	18.1%

Pole Info	
OD:	26.88 in
t:	0.3750 in
Pole A_G:	31.55 in^2
Pole I_G:	2,799.6 in^4

Controlling	
Angle:	120.00°
I_G:	4,123.1 in^4
A_G:	45.05 in^2

Minimum	
Angle:	109.60°
I_{MIN}:	4,123.1 in^4
t_{EFF}:	0.5643 in



Pole Segment: L3, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	13.65	4123.1	0.288	35.136	52.000	52.000	68.1%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
5	1	0.00	13.94	4123.1	0.288	35.869	38.419	38.519	94.1%
5	2	120.00	13.94	4123.1	0.288	35.869	38.419	38.519	94.1%
5	3	240.00	13.94	4123.1	0.288	35.869	38.419	38.519	94.1%

Elevation: 91.92-ft

Loads	
Axial:	10.9 k
Moment:	728.4 k-ft
Shear:	17.1 k
Torsion:	0.4 k-ft

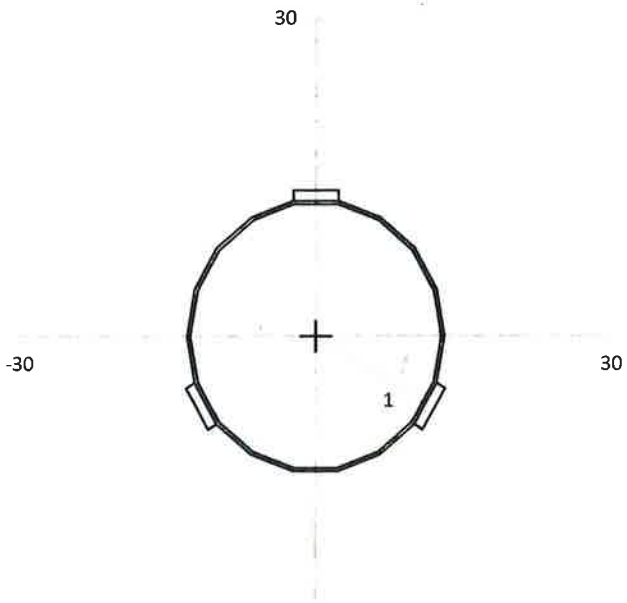
Pole Info	
OD:	25.53 in
t:	0.3125 in
Pole A_G:	25.01 in^2
Pole I_G:	2,009.7 in^4

Equivalent Loads to Pole	
Axial:	7.1 k
Moment:	456.1 k-ft
Shear:	11.1 k
Torsion:	0.4 k-ft

Controlling	
Angle:	120.00°
I_G:	3,209.4 in^4
A_G:	38.51 in^2

Shear Flow	
Controlling Mod:	6
q:	0.317 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	94.54 in
Stitch:	20.00 in
Capacity:	21.2%

Minimum	
Angle:	113.50°
I_{MIN}:	3,209.4 in^4
t_{EFF}:	0.5110 in



Pole Segment: L2, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	12.97	3209.4	0.284	35.323	52.000	52.000	68.5%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
5	1	0.00	13.27	3209.4	0.284	36.129	38.419	38.519	94.8%
5	2	120.00	13.27	3209.4	0.284	36.129	38.419	38.519	94.8%
5	3	240.00	13.27	3209.4	0.284	36.129	38.419	38.519	94.8%

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Elevation: 108.50-ft

Loads	
Axial:	8.1 k
Moment:	455.7 k-ft
Shear:	15.8 k
Torsion:	0.4 k-ft

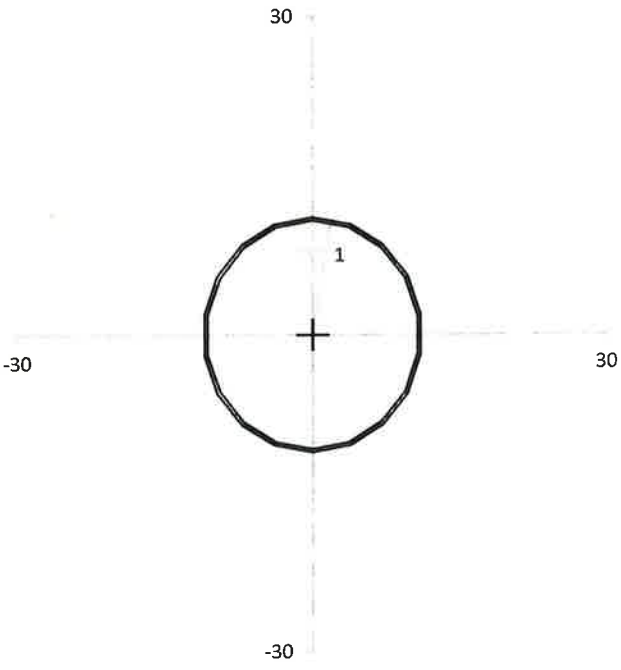
Equivalent Loads to Pole	
Axial:	8.1 k
Moment:	455.7 k-ft
Shear:	15.8 k
Torsion:	0.4 k-ft

Shear Flow N/A

Pole Info	
OD:	21.86 in
t:	0.3125 in
Pole A_G:	21.37 in^2
Pole I_G:	1,252.9 in^4

Controlling	
Angle:	10.00°
I_G:	1,252.9 in^4
A_G:	21.37 in^2

Minimum	
Angle:	0.00°
I_{MIN}:	1,252.9 in^4
t_{EFF}:	0.3125 in



Pole Segment: L2, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
10.00	11.10	1252.9	0.381	48.460	52.000	52.000	93.9%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity

Elevation: 136.29-ft

Loads	
Axial:	3.3 k
Moment:	67.7 k·ft
Shear:	9.8 k
Torsion:	0.0 k·ft

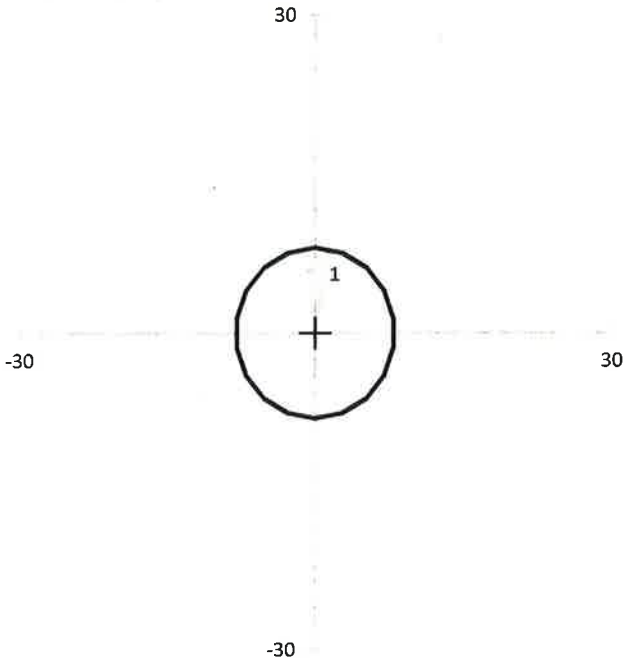
Pole Info	
OD:	16.07 in
t:	0.1875 in
Pole A_G:	9.45 in^2
Pole I_G:	301.3 in^4

Equivalent Loads to Pole	
Axial:	3.3 k
Moment:	67.7 k·ft
Shear:	9.8 k
Torsion:	0.0 k·ft

Controlling	
Angle:	10.00°
I_G:	301.3 in^4
A_G:	9.45 in^2

Shear Flow N/A

Minimum	
Angle:	0.00°
I_{MIN}:	301.3 in^4
t_{EFF}:	0.1875 in



Pole Segment: L1, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
10.00	8.16	301.3	0.346	22.005	52.000	52.000	43.0%

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	Y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity

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

TIA Rev F

Site Data

BU#: *876384*
Site Name: *Westbrook / Orsina*
App #: *244207 Rev. 3*

Pole Manufacturer:	*Other*

Reactions		
Moment:	2617	ft-kips
Axial:	35	kips
Shear:	24	kips

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

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	53	in

Plate Data		
Diam:	59	in
Thick:	1.75	in
Grade:	60	ksi
Single-Rod B-eff:	11.77	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Groove	
Groove Depth:	0.375	in **
Groove Angle:	45	degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:	0.375	in
Width:	7	in
Height:	18	in
Thick:	0.75	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	44.5	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	194.6 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	99.8% **Pass**	

Base Plate Results

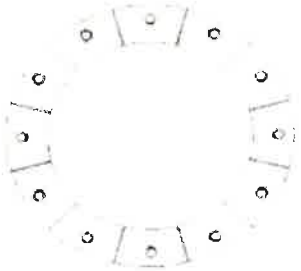
	Flexural Check	Stiffened
Base Plate Stress:	59.3 ksi	Service, ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	98.9% **Pass**	Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	73.3% **Pass**
Vertical Weld:	55.5% **Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	26.8% **Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	74.2% **Pass**
Plate Comp. (AISC Bracket):	80.9% **Pass**

Pole Results

Pole Punching Shear Check:	16.7% **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

TOWER ENGINEERING PROFESSIONALS

JOB:	Westbrook / Orsina (BU 876384); TEP No. 25589.31758		
SHEET NUMBER:	1	OF	2
CALCULATED BY:	GJS	DATE	4/23/2015
CHECKED BY:	JLK	DATE	4/23/2015

Pad and Pier Foundation for Monopole - TIA-222-F

Q_a, ALLOWABLE SOIL PRESS. (ksf)	4
NET or GROSS	NET
SOIL DENSITY (pcf)	100

F'c (ksi)	4
F'y (ksi)	60

Base Reactions LC1: Maximum Wind

M, MOMENT (k-ft)	2617.0
P_t, TOTAL DOWNLOAD (k)	35.0
H, HORIZONTAL SHEAR (k)	24.0

Base Reaction LC 2: Ice Wind + Ice

M (k-ft)	713.0
P_t (k)	46.0
H (k)	6.0

Try:

L (ft.)	B (ft.)	t (ft.)	Soil depth to TOP of mat (ft.)	Soil depth to BOT. of mat (ft.)	Pier dia./width (ft.)	Pier Height, h (cu.ft.)	Pier Shape
28	28	3	2	5	6.00	3.00	Square

W_m, Weight of Mat (k) =	352.8
W_p, Weight of Pier (k) =	16.2
W_s, WEIGHT OF SOIL (k) =	149.6

Concrete Vol. (cu yd) 91.11

CHECK DESIGN CRITERIA

CHECK STABILITY:	LC1	LC2		
Mst= P * (L/2) + (Vf+s * L/2) =	7750.4 k-ft	7904.4 k-ft		
Mot = M+H*(t+h) =	2761.0 k-ft	749 k-ft		
SF =Mot/Mst =	2.81 > 1.5	10.55 > 1.5	**Capacity:**	53.4%

CHECK BEARING PRESSURE	LC1	LC2		
P = P_t + W_f + Ws =	553.6 k	564.6 k		
e = M / P =	4.99 ft	1.33 ft		
L/6 =	4.67 ft	4.67 ft		
Width of Wedge, L' =	27.04 ft	28.00 ft		
0 Deg Wind: Qmax =	0.96 ksf	0.42 ksf		
45 Deg Wind: Qmax =	1.32 ksf	0.51 ksf	**Capacity:**	32.9%

TOWER ENGINEERING PROFESSIONALS

JOB:	Westbrook / Orsina (BU 876384); TEP No. 25589.31758		
SHEET NUMBER:	2	OF	2
CALCULATED BY:	GJS	DATE	4/23/2015
CHECKED BY:	JLK	DATE	4/23/2015

CHECK ONE WAY SHEAR

Vu =	376.8 k
Vc =	1020.0 k

Capacity: 36.94%

CHECK TWO WAY SHEAR: PUNCHING + UNBALANCED MOMENT

v_u =	34.9 psi
φv_c =	189.7 psi

Capacity: 18.41%

CALCULATE REINFORCING REQUIRED

F'c = 4.0 ksi F'y = 60.0 ksi

Temp & Shrinkage reinforcing, $A_{s,\ temp}$ = 0.39 in^2/ft (ACI 318 Sec. 10.5.4)

BOTTOM REINFORCING

Bar Size = 8
Bar Spacing, c-c: 12.3
d = 31.5 in.
Mu= 588.3 in-k/ft

φMn=0.9*As*Fy*d(1-0.59*As*Fy/(b*d*F'c))

Solution: As,req = 0.35 in^2/ft

Check, As = 0.77 in^2/ft

Capacity: 45.06%

TOP REINFORCING

Bar Size = 8
Bar Spacing, c-c: 13.8
d= 31.5 in.
Mu= 462.6 in-k/ft

φMn=0.9*As*Fy*d(1-0.59*As*Fy/(b*d*F'c))

Solution: As,req = 0.27 in^2/ft **As,req < As,t, Use As,t**

Bar Spacing, c-c:

Check, As = 0.69 in^2/ft **Top Reinforcing O.K.**

Capacity: 39.70%

		PASS	PASS	Westbrook / Orsina (BU 876384)
	Results Summary:	LC1	LC2	TEP #: 25589.31758
	Soil Interaction:	N/A	N/A	Analysis: GJS 4/23/2015
Drilled Caisson Tool - Pier Check	Foundation Structural:	44.0%	11.9%	Check: JLK 4/23/2015

Code Revisions: TIA-222-F ACI 318-02

Tower Type: Monopole

	LC1	LC2	
Moment:	2,689.00	731.00	kip-ft
Axial (download):	35.00	46.00	kip
Shear:	24.00	6.00	kip
Axial (uplift):			kip

Shaft Information

Diameter:	6.00	ft
Projection:	1.00	ft
Caisson Length:	3.00	ft
f'c:	4.000	ksi
Max εc:	0.003	in/in

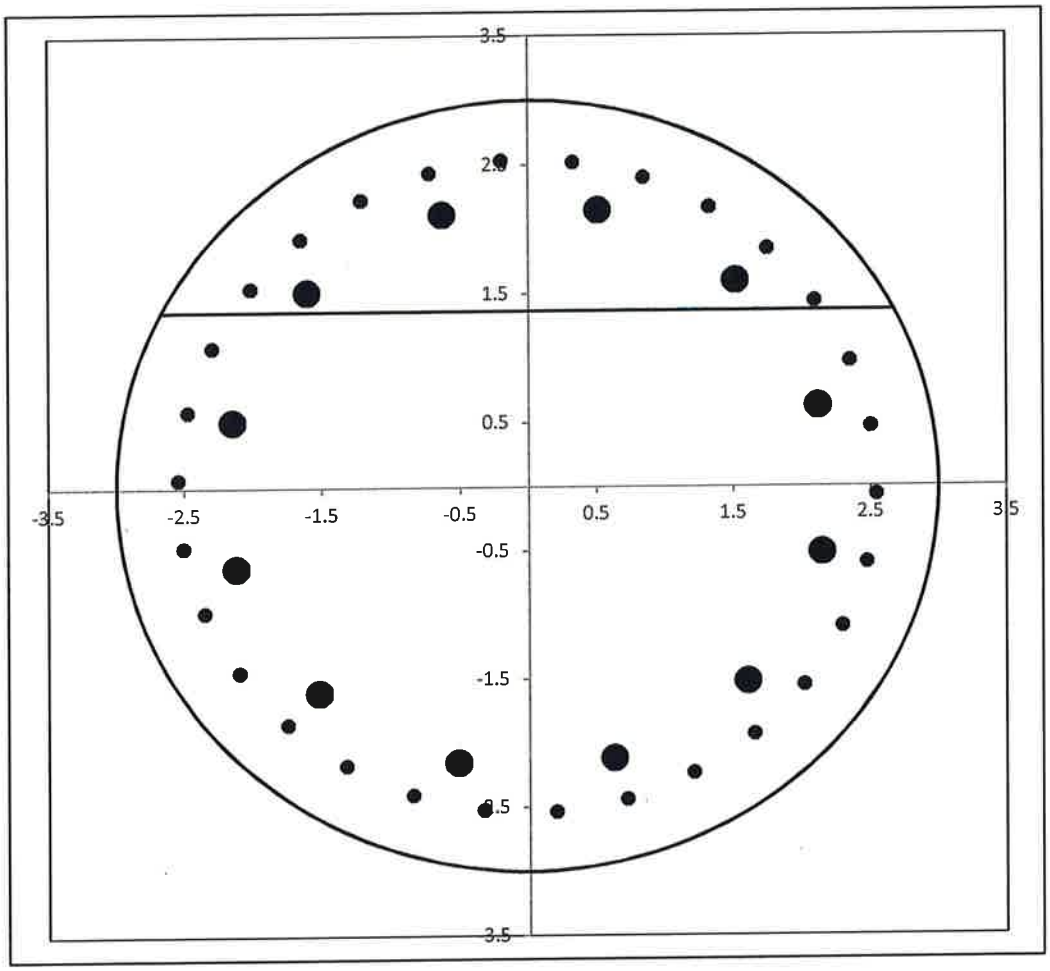
Cage 1 Reinforcement

Tie Bar Size:	4	*(fy = 60.0 ksi)*
Clear Cover to Tie:	4.50	*in (Cage Ø = 61.00in)*
Tie Bar Spacing:	10.00	in
Vertical Bar Size:	8	
Vertical Bar Quantity:	30	*(ρ =0.582%)*
fy:	60.0	ksi
E:	29,000	ksi

Cage 2 Reinforcement

Cage Diameter:	53.00	in	
Offset Angle:	0.0	degrees	
Vertical Bar Size:	Other	→ Anet =	3.25
Vertical Bar Qty:	12	*(ρ =0.958%)*	
Cage 2 resists compression?	No		
Effective Cage Depth:	3	ft	
fy:	75	ksi	
E:	29,000	ksi	

Reinforcement Capacity

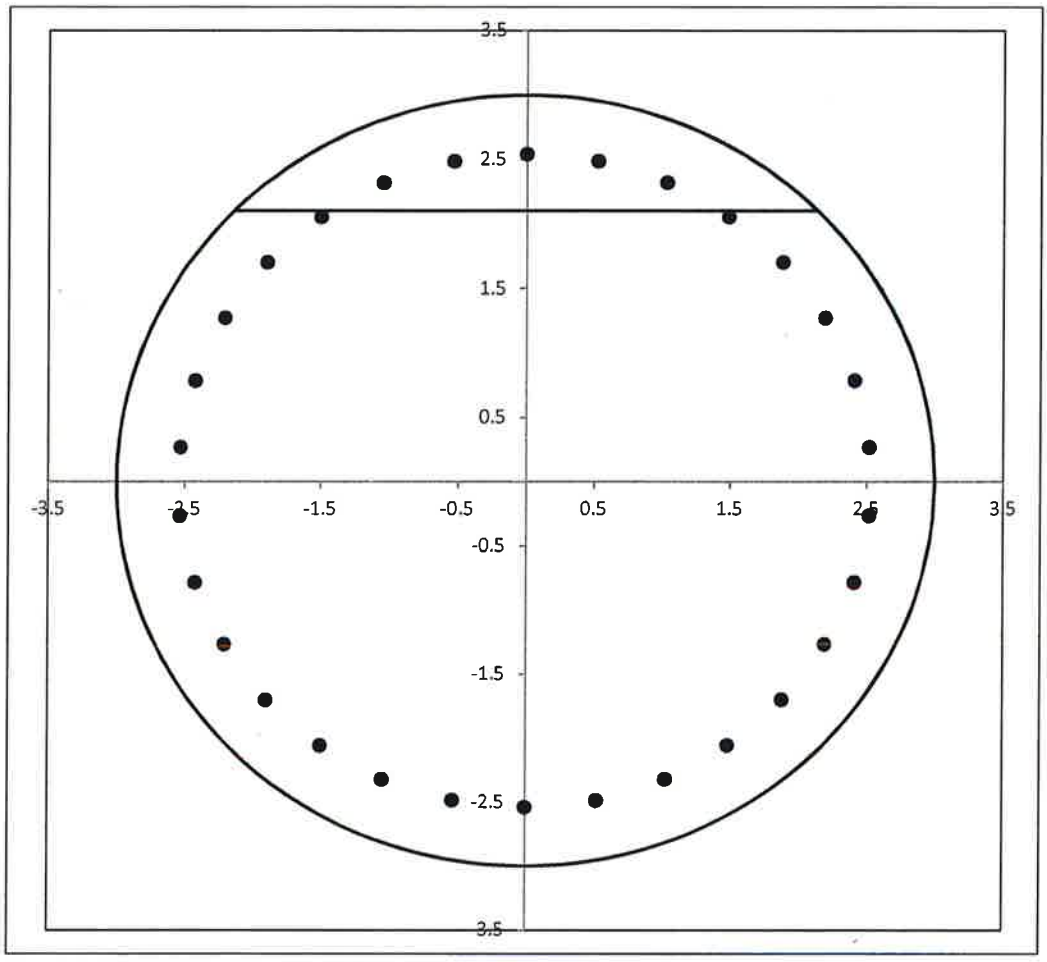


fy,tie = 60.0

	LC1	LC2	
Vu =	31.2	31.2	kip
Vc =	517.2	517.9	kip
Vs =	159.2	159.2	kip
ϕVn =	507.3	507.8	kip
Capacity =	6.2%	6.1%	
	PASS	PASS	

	LC1	LC2	
Mu =	3495.7	950.3	kip-ft
ϕMn =	7952.4	7972.3	kip-ft
Capacity =	44.0%	11.9%	
	PASS	PASS	

Reinforcement Capacity, continued



	LC1	LC2	
Mu =	0.0	0.0	kip-ft
ϕMn =	3283.9	3315.3	kip-ft
Capacity =	0.0%	0.0%	
	PASS	PASS	

APPENDIX D

STRUCTURAL DESIGN DRAWINGS

STRUCTURAL DESIGN DRAWINGS

SITE NAME:

WESTBROOK / ORSINA

CROWN CASTLE BU NUMBER:

876384

APPLICATION NUMBER:

244207 REV. 3

SITE ADDRESS:

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)
N 41° 19' 12.70", W 72° 26' 32.20"

MODIFICATION PROVISIONS

THE MODIFICATIONS DEPICTED ON THESE DRAWINGS ARE BASED ON THE RECOMMENDATIONS OUTLINED IN THE STRUCTURAL MODIFICATION ANALYSIS REPORT COMPLETED BY TOWER ENGINEERING PROFESSIONALS (TEP), JOB#: 25589.31758 DATED APRIL 24, 2015 (REV 0). THIS REPORT IS BASED ON A SPECIFIC ANTENNA LOADING AND COAX CONFIGURATION. SEE THE REPORT FOR THE ANTENNA AND COAX LOADING INFORMATION. ANY OTHER ANTENNA OR COAX CONFIGURATION REQUIRES REVIEW BY TEP. SATISFACTORY COMPLETION OF THE MODIFICATIONS INDICATED ON THESE DRAWINGS WILL RESULT IN THE STRUCTURE MEETING THE REQUIREMENTS OF THE SPECIFICATIONS UNDER WHICH THE STRUCTURAL WAS COMPLETED.

CONTRACTOR SHALL FIELD VERIFY ALL: DIMENSIONS, QUANTITIES, PART NUMBERS AND COAX/ANTENNA PLACEMENTS PRIOR TO: BIDDING ORDERING MATERIALS, AND CONSTRUCTION.

REVISION NOTES

1	REVISED MODIFICATION DRAWINGS

INDEX OF SHEETS

PROJECT TEAM

CCI MODIFICATION PROJECT MANAGER:

NAME	CROWN CASTLE
ADDRESS	3530 TORINGDON WAY, SUITE 300
CITY, STATE, ZIP	CHARLOTTE, NC 28277
CONTACT	JOHN MCGEE
PHONE	(980) 209-8253
EMAIL	JOHN.MCGEE@CROWNCASTLE.COM

ENGINEERING FIRM PROJECT MANAGER:

NAME	TOWER ENGINEERING PROFESSIONALS, INC.
ADDRESS	326 TRYON ROAD
CITY, STATE, ZIP	RALEIGH, NC 27603
CONTACT	RYAN J. RIMMELE, P.E., S.E.
PHONE	(919) 661-6351
EMAIL	CMRP@TEPGROUP.NET

ATTENTION

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

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

May 04, 2015

REV	DATE	ISSUED FOR:
1	05-04-15	REVISED MOD. DRAWINGS
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

TITLE SHEET

SHEET NUMBER: **T-1**

REVISION: 1

TEP #: 25589.31758

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
X	NDE REPORT OF MONOPOLE BASE PLATE PER ENG-SOW-10033
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
NA	CONTINUOUS FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	GROUT COMP. STRENGTH (ASTM C109)
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S 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
X	NON-TENSION CONTROLLED BOLT INSPECTION. SEE SHEET N-4 FOR DETAILS.
ADDITIONAL TESTING AND INSPECTIONS:	
POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

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

MODIFICATION INSPECTION NOTES:

GENERAL

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

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

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 ENG-BUL-10173 LIST OF 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 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 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 IS RESPONSIBLE FOR COLLECTING ALL GENERAL CONTRACTORS (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 ENG-SOW-10007.

RECOMMENDATIONS

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

- IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, 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 FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.

RECOMMENDATIONS (CONTINUED)

- 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 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 EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.

MI VERIFICATION INSPECTIONS

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

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

VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT AEV/AESV FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE OF AN ACCEPTED "PASSING MI" OR "PASS AS NOTED MI" 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/ERECTIONS AND INSPECTION:
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION AND TORQUE
  - FINAL INSTALLED CONDITION
  - SURFACE COATING REPAIR
- POST CONSTRUCTION PHOTOGRAPHS
  - FINAL IN FIELD CONDITION

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

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

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.teogroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

MI CHECKLIST AND NOTES

SHEET NUMBER: **N-1**

REVISION: 0

TEP #: 25589.31758

GENERAL NOTES:

1. ALL REFERENCES TO THE OWNER IN THESE DOCUMENTS SHALL BE CONSIDERED CROWN CASTLE OR ITS DESIGNATED REPRESENTATIVE.
2. ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE. THE CONTRACTOR MUST HAVE CONSIDERABLE EXPERIENCE IN 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 AND THAT HE IS PROPERLY LICENSED AND PROPERLY REGISTERED TO DO THIS WORK IN THE STATE OF CONNECTICUT.
3. WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE, 2003 EDITION.
4. UNLESS SHOWN OR NOTED OTHERWISE ON THE CONTRACT DRAWINGS, OR IN THE SPECIFICATIONS, THE FOLLOWING NOTES SHALL APPLY TO THE MATERIALS LISTED HEREIN, AND TO THE PROCEDURES TO BE USED ON THIS PROJECT.
5. ALL HARDWARE ASSEMBLY MANUFACTURER'S INSTRUCTIONS SHALL BE FOLLOWED EXACTLY AND SHALL SUPERSEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.
6. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION AND/OR FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT.
7. ALL DIMENSIONS, ELEVATIONS, AND EXISTING CONDITIONS SHOWN ON THE DRAWINGS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO BEGINNING ANY MATERIALS ORDERING, FABRICATION OR CONSTRUCTION WORK ON THIS PROJECT. CONTRACTOR SHALL NOT SCALE CONTRACT DRAWINGS IN LIEU OF FIELD VERIFICATIONS. ANY DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER AND THE OWNER'S ENGINEER. THE DISCREPANCIES MUST BE RESOLVED BEFORE THE CONTRACTOR IS TO PROCEED WITH THE WORK. THE CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTION OF THE PROTECTIVE MEASURES OR THE PROCEDURES.
8. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK.
10. ACCESS TO THE PROPOSED WORK SITE MAY BE RESTRICTED. THE CONTRACTOR SHALL COORDINATE INTENDED CONSTRUCTION ACTIVITY, INCLUDING WORK SCHEDULE AND MATERIALS ACCESS, WITH THE RESIDENT LEASING AGENT FOR APPROVAL.
11. ALL PERMITS THAT MUST BE OBTAINED ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.
12. IF APPLICABLE, ALL CONCRETE WORK SHALL COMPLY TO LOCAL CODES AND THE ACI 318-02, "BUILDING REQUIREMENTS FOR STRUCTURAL CONCRETE".
13. 24 HOURS PRIOR TO THE BEGINNING OF ANY CONSTRUCTION, THE CONTRACTOR MUST NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY OR CITY) ENGINEER.
14. ALL MATERIALS AND WORKMANSHIP SHALL BE WARRANTED FOR ONE YEAR FROM ACCEPTANCE DATE.
15. ALL TOWER DIMENSIONS SHALL BE VERIFIED WITH THE PLANS (LATEST REVISION) PRIOR TO COMMENCING CONSTRUCTION. NOTIFY THE ENGINEER IMMEDIATELY IF ANY DISCREPANCIES ARE DISCOVERED. THE OWNER SHALL HAVE A SET OF APPROVED PLANS AVAILABLE AT THE SITE AT ALL TIMES WHILE WORK IS BEING PERFORMED. A DESIGNATED RESPONSIBLE EMPLOYEE SHALL BE AVAILABLE FOR CONTACT BY GOVERNING AGENCY INSPECTORS.
16. ALL TOWER MODIFICATION WORK SHALL BE IN ACCORDANCE WITH TIA-1019-A STANDARD FOR INSTALLATION, ALTERATION AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.
17. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE TOWER OWNER OR ENGINEER OF RECORD.

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
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(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

PROJECT NOTES I

SHEET NUMBER: **N-2**

REVISION: **0**

TEP #: 25589.31758

STRUCTURAL STEEL NOTES:

1. THE FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AISC SPECIFICATION FOR MANUAL OF STEEL CONSTRUCTION, ALLOWABLE STRESS DESIGN (ASD), 9TH EDITION.
2. UNLESS OTHERWISE NOTED, ALL STRUCTURAL ELEMENTS SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
   STRUCTURAL STEEL:
   - ANGLE: ASTM A36
   - PIPE/TUBE: ASTM A500-50
   - PLATE: ASTM A36 (SELF SUPPORTING AND GUYED TOWERS)
   - PLATE: ASTM A572-65 (MONOPOLE)

   A. ALL BOLTS, ASTM A325 TYPE I GALVANIZED HIGH STRENGTH BOLTS.
   B. ALL U-BOLTS, ASTM A193 GRADE B7
   C. ALL NUTS, ASTM A563 CARBON AND ALLOY STEEL NUTS.
   D. ALL WASHERS, ASTM F436 HARDENED STEEL WASHERS.
3. ALL CONNECTIONS NOT FULLY DETAILED ON THESE PLANS SHALL BE DETAILED BY THE STEEL FABRICATOR IN ACCORDANCE WITH AISC SPECIFICATION FOR MANUAL OF STEEL CONSTRUCTION, ASD, 9TH EDITION.
4. HOLES SHALL NOT BE FLAME CUT THRU STEEL UNLESS APPROVED BY THE ENGINEER.
5. HOT-DIP GALVANIZE ALL ITEMS UNLESS OTHERWISE NOTED, AFTER FABRICATION WHERE PRACTICABLE. GALVANIZING: ASTM A123, ASTM, A153/A153M OR ASTM A653/A653M, G90, AS APPLICABLE. ADDITIONALLY, ALL NEW STEEL SHALL BE PAINTED TO MATCH EXISTING STEEL. CONTRACTOR SHALL OBTAIN WRITTEN PERMISSION TO PROTECT STEEL BY ANY OTHER MEANS.
6. REPAIR DAMAGED SURFACES WITH GALVANIZING REPAIR METHOD AND PAINT CONFORMING TO ASTM A780 OR BY APPLICATION OF STICK OR THICK PASTED MATERIAL SPECIFICALLY DESIGNED FOR REPAIR OF GALVANIZING. CLEAN AREAS TO BE REPAIRED AND REMOVE SLAG FROM WELDS. HEAT SURFACES TO WHICH STICK OR PASTE MATERIAL IS APPLIED, WITH A TORCH TO A TEMPERATURE SUFFICIENT TO MELT THE METALLICS IN STICK OR PASTED; SPREAD MOLTEN MATERIAL UNIFORMLY OVER SURFACES TO BE COATED AND WIPE OFF EXCESS MATERIAL. AFTER REPAIR, STEEL SHALL BE REPAINTED TO MATCH EXISTING FINISH (IF APPLICABLE).
7. A NUT LOCKING DEVICE SHALL BE INSTALLED ON ALL PROPOSED AND/OR REPLACED BOLTS.
8. ALL PROPOSED AND/OR REPLACED BOLTS SHALL BE OF SUFFICIENT LENGTH TO EXCLUDE THE THREADS FROM THE SHEAR PLANE.
9. 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.
10. GALVANIZED ASTM A325 BOLTS SHALL NOT BE REUSED.

WELDING NOTES:

1. ALL WELDING SHALL BE IN ACCORDANCE WITH THE AWS D1.1/D1.1M: 2000 "STRUCTURAL WELDING CODE-STEEL".
2. ALL WELDING SHALL BE PERFORMED BY AWS CERTIFIED WELDERS.
3. CONTRACTOR SHALL RETAIN AN AWS CERTIFIED WELD INSPECTOR TO PERFORM VISUAL INSPECTIONS ON FIELD WELDS. A LETTER AND REPORT SHALL BE ISSUED TO THE CONTRACTOR. CONTRACTOR SHALL SUBMIT LETTER AND REPORT TO TOWER ENGINEERING PROFESSIONALS.
4. GRIND THE SURFACE ADJACENT TO THE WELD FOR A DISTANCE OF 2" MINIMUM ALL AROUND. GRIND THE SURFACE OF THE ROD TO BE INSTALLED FOR A DISTANCE OF 2" MINIMUM ALL AROUND THE AREA TO BE WELDED. ENSURE BOTH AREAS ARE 100% FREE OF ALL GALVANIZING. SURFACES TO BE WELDED SHALL BE FREE FROM SCALE, SLAG, RUST, MOISTURE, GREASE OR ANY OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING.
5. DO NOT WELD IF THE TEMPERATURE OF THE STEEL IN THE VICINITY OF THE WELD AREA IS BELOW 0°F. THE MINIMUM PREHEAT AND INTERPASS TEMPERATURE REQUIREMENTS SHALL COMPLY WITH SECTION 3.5.1 AND TABLE 3.2 OF THE AWS D1.1/D1.1M:2000.
6. DO NOT WELD ON WET OR FROST-COVERED SURFACES & PROVIDE ADEQUATE PROTECTION FROM HIGH WINDS.
7. FOR ALL WELDING, USE 80 KSI LOW HYDROGEN ELECTRODES. ELECTRODES SHALL BE APPROPRIATE FOR THE WELDING POSITION REQUIRED TO MAKE THE JOINT.
8. AFTER FINAL INSPECTION, THE AREA OF THE WELDS, THE INSTALLATION AND ALL SURFACES DAMAGED BY WELDING OR GRINDING SHALL RECEIVE A COLD-GALVANIZED COATING. THIS COATING SHALL BE APPLIED BY BRUSH. THE GALVANIZING COMPOUND SHALL CONTAIN A MINIMUM OF 95% ± PURE ZINC. THE FINISHED COATING SHALL BE A MINIMUM THICKNESS OF 3 MILS.
9. FOR MONOPOLE TOWERS FULL PENETRATION WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY ULTRASONIC TESTING (UT) IN ACCORDANCE WITH AWS D1.1.
10. FOR MONOPOLE TOWERS PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MAGNETIC PARTICLE (MT) IN ACCORDANCE WITH AWS D1.1.

WORKABLE GAGES

LEG	4	3½	3	2½	2	1¾
G	2	1¾	1½	1¼	1	⅞

- WORKABLE GAGES GIVEN IN INCHES
- MATCH EXISTING WHEN APPLICABLE

BOLT TIGHTENING PROCEDURE:

1. TIGHTEN CONNECTION BOLTS BY AISC - "TURN OF THE NUT" METHOD, USING THE CHART BELOW.

BOLT LENGTHS UP TO AND INCLUDING FOUR DIA.

½"	BOLTS UP TO AND INCLUDING 2.0 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
⅝"	BOLTS UP TO AND INCLUDING 2.5 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
¾"	BOLTS UP TO AND INCLUDING 3.0 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
⅞"	BOLTS UP TO AND INCLUDING 3.5 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
1"	BOLTS UP TO AND INCLUDING 4.0 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT

BOLT LENGTHS OVER FOUR DIA. BUT NOT EXCEEDING EIGHT DIA.

½"	BOLTS 2.25 TO 4.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
⅝"	BOLTS 2.75 TO 5.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
¾"	BOLTS 3.25 TO 6.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
⅞"	BOLTS 3.75 TO 7.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
1"	BOLTS 4.25 TO 8.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT

2. CONNECTION BOLTS SUBJECT TO DIRECT TENSION SHALL BE INSTALLED AND TIGHTENED AS PER SECTION 8.2.1 OF THE AISC SPECIFICATION FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS, LOCATED IN THE AISC MANUAL OF STEEL CONSTRUCTION. THE INSTALLATION PROCEDURE IS PARAPHRASED AS FOLLOWS:
3. FASTENERS SHALL BE INSTALLED IN PROPERLY ALIGNED HOLES AND TIGHTENED BY ONE OF THE METHODS DESCRIBED IN SUBSECTION 8.2.1 THROUGH 8.2.4.

8.2.1 TURN-OF-THE-NUT TIGHTENING

BOLTS SHALL BE INSTALLED IN ALL HOLES OF THE CONNECTION AND BROUGHT TO A SNUG TIGHT CONDITION AS DEFINED IN SECTION 8.1, UNTIL ALL THE BOLTS ARE SIMULTANEOUSLY SNUG TIGHT AND THE CONNECTION IS FULLY COMPACTED. FOLLOWING THIS INITIAL OPERATION ALL BOLTS IN THE CONNECTION SHALL BE TIGHTENED FURTHER BY THE APPLICABLE AMOUNT OF ROTATION SPECIFIED ABOVE. DURING THE TIGHTENING OPERATION THERE SHALL BE NO ROTATION OF THE PART NOT TURNED BY THE WRENCH. TIGHTENING SHALL PROGRESS SYSTEMATICALLY FROM THE MOST RIGID PART OF THE JOINT IN A MANNER THAT WILL MINIMIZE RELAXATION OF PREVIOUSLY PRETENSIONED BOLTS.

4. ALL OTHER BOLTED CONNECTIONS SHALL BE BROUGHT TO A SNUG TIGHT CONDITION AS DEFINED IN SECTION 8.1 OF THE SPECIFICATION.

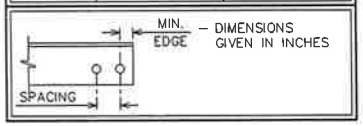
NOMINAL HOLE DIMENSIONS

BOLT DIAMETER	STANDARD HOLE	SHORT SLOT
½	9/16	9/16 X 1/16
⅝	11/16	11/16 X ⅞
¾	13/16	13/16 X 1
⅞	15/16	15/16 X 1⅛
1	1 1/16	1 1/16 X 1 5/16

- DIMENSIONS GIVEN IN INCHES

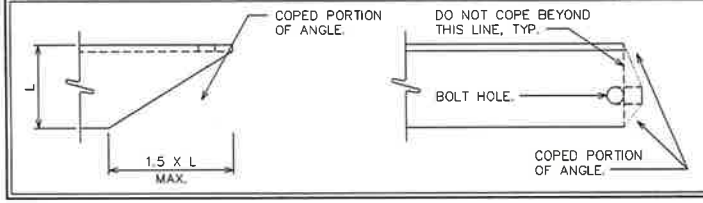
BOLT EDGE AND SPACING

BOLT DIAMETER	MIN. EDGE	SPACING
½	⅞	1½
⅝	1⅛	1⅞
¾	1¼	2¼
⅞	1½	2⅝
1	1¾	3



- DIMENSIONS GIVEN IN INCHES

ALLOWABLE ANGLE COPE



PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

PROJECT NOTES II

SHEET NUMBER: **N-3**

REVISION: 0

TEP #: 25589.31758

BOLTS AND COMPONENTS SPECIFICATIONS:

BOLT:
AJAX M20 "ONE SIDE" BLIND BOLT

SHEAR SLEEVE:
Fu = 120 KSI (MINIMUM)
29mm O.D. X 20 mm I.D.
LENGTH = NOMINAL [GRIP-6mm] = [GRIP - 0.25"] (TOLERANCE: -0", +1/32")
SLEEVE SHALL BE ROUND, WITH ENDS CUT SQUARE AND DEBURRED.

SPECIAL WASHER:
ASTM F959 SQUIRTER® DTI M20 (EQUIVALENT TO A325 BOLT)
MANUFACTURER:
APPLIED BOLTING TECHNOLOGY PRODUCTS, INC.
1413 ROCKINGHAM ROAD BELLOW FALLS, VERMONT, USA 05101
PHONE: (800) 552-1999
WEBSITE: WWW.APPLIEDBOLTING.COM

DISTRIBUTORS OF SQUIRTER® DTI'S:
HTTP://WWW.APPLIEDBOLTING.COM/APPLIED-BOLTING-DISTRIBUTORS.HTML

WASHER:
ASTM F436 HARDENED FLAT WASHER M20

BOLT ASSEMBLY FINISHING:
SHEAR SLEEVE: COLD GALVANIZED AS PER CROWN ENG-BUL-10149 OR CADMIUM PLATED
ALL OTHER PARTS: HOT DIP GALVANIZED

BOLT INSTALLATION ASSEMBLY:
AS SHOWN ON THE DRAWING

INSTALLATION NOTES:
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.

TIGHTEN THE BOLT ASSEMBLY UNTIL THE ORANGE SILICONE APPEARS FROM UNDER THE DTI'S SQUIRT LOCATIONS, THEN STOP TIGHTENING.

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

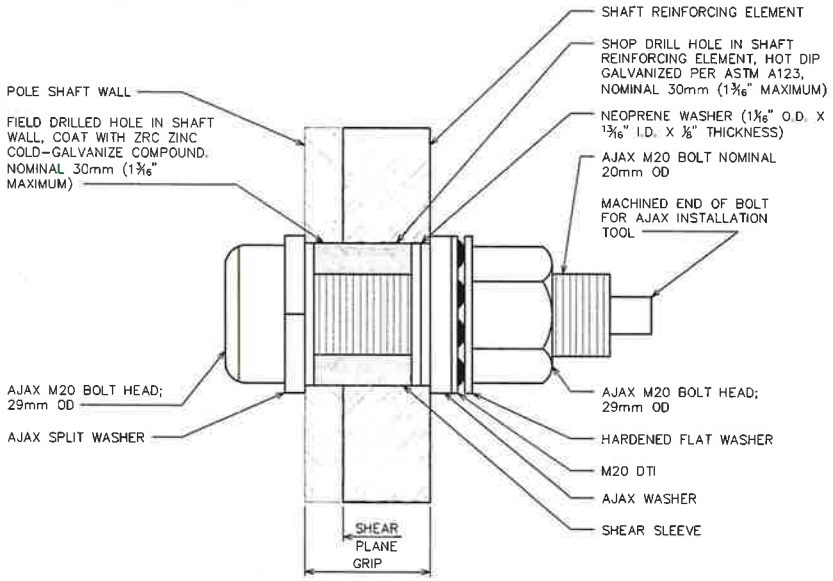
AS AN ALTERNATIVE TO USING THE DTI WASHER THE BOLTS MAY BE PRETENSIONED USING THE TURN-OF-NUT METHOD AS SPECIFIED IN SECTION 8.2.1 TURN-OF-NUT PRETENSIONING OF THE RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS. ALL FASTENERS SHALL BE INSPECTED PER SECTION 9.2.1 OF THE RCSC SPECIFICATION. THE BOLTS SHALL BE MATCH MARKED WITH A PERMANENT MARKER TO FACILITATE THE INSPECTION.

INSPECTION:
ALL AJAX BOLTS WITH DTI'S SHALL BE VISUALLY INSPECTED ACCORDING TO THE DTI MANUFACTUER'S INSTRUCTIONS BOLT INSPECTOR SHALL PROVIDE PHOTO DOCUMENTATION OF BOLTS AFTER TIGHTENING CLEARLY SHOWING THE CONDITION OF THE DTI'S.

INSPECTION PROCEDURES:
- REVIEW MODIFICATION DESIGN DRAWINGS.
- ENSURE AISC PRE-TENSION REQUIREMENTS ARE INCLUDED.
- PHOTO (PREFERABLY VIDEO) OF THE FOLLOWING:
  - NOTE THE PRESENCE OF ANY LUBRICANT
  - NOTE THE PRESENCE OF ANY NUT/BOLT MARKINGS USED TO APPLY THE AISC "TURN OF THE NUT" METHOD PRIOR TO APPLYING NEW MARKINGS
  - BE SURE THAT ANY NEW MARKINGS MADE BY THE MI INSPECTOR ARE DISTINGUISHABLE (DIFFERENT COLOR) TO ANY ORIGINAL MARKINGS
  - MARK THE BOLT AND NUT WITH MARKER TO DOCUMENT POSITION UPON ARRIVAL. RUN THE MARK ONTO THE POLE AS WELL.
  - USE YOUR HAND TO FIRST ASSURE THE NUT IS TIGHT, TRYING TO TURN THE NUT IN ANY DIRECTION.
  - BOLT TYPES:
  - FOR AJAX, USING AJAX TOOL TO HOLD THE BOLT AND A SPUD WRENCH (OR SIMILAR) ON THE NUT, APPLY FIRM FORCE TO THE NUT IN THE CLOCKWISE DIRECTION (THIS IS NOT THE FULL EFFORT OF THE PERSON).
  - FOR OTHER STRUCTURAL BOLTS, ENSURE THE BOLT CAN BE HELD WHILECHECKING THE TIGHTNESS OF THE ASSEMBLY.
  - DOCUMENT BOLTS TESTED AND RESULTS, USE THE NUMBER CONVENTION BELOW AND WRITE ON THE POLE AND PHOTOGRAPH:
  - A THREE DIGIT CONVENTION SHALL BE USED (1, 3, 15)
  - THE FIRST DIGIT - THE FLAT NUMBER. ON ROUND POLES, THIS FIRST DIGIT SHALL BE REPLACED WITH THE HEADING (N, NE, E, SE, S, SW, W, N, NW)
  - THE SECOND DIGIT - THE NUMBER OF REINFORCING BARS ON THAT FLAT, STARTING WITH THE LOWEST BAR AS 1
  - THE THIRD DIGIT - THE NUMBER OF BOLTS ON THAT BAR STARTING WITH THE LOWEST BOLT AS 1
  - FLATS AND ROUND POLES ARE TO BE LABELED IN ACCORDANCE WITH THE MONOPOLE FLAT NUMBER PROCEDURE

INTERIOR OF POLE SHAFT

EXTERIOR OF POLE SHAFT



AJAX BOLT DETAILS

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

AJAX BOLT INSTALLATION DETAILS

SHEET NUMBER: **N-4**

REVISION: **0**

TEP #: 25589.31758

NOTES:

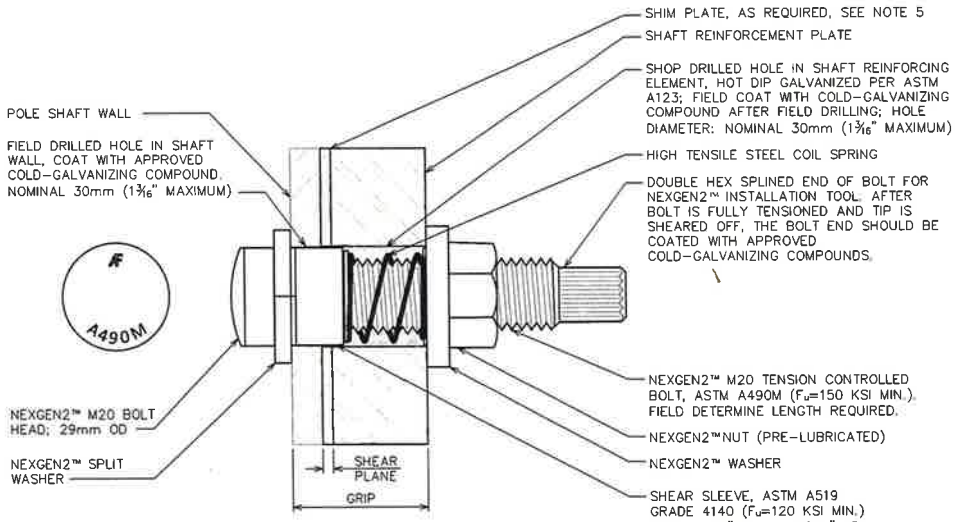
1. ALL SHOP AND FIELD DRILLED HOLES SHALL BE NOMINAL 30mm DIAMETER. THE MAXIMUM HOLE DIAMETER PERMITTED IS 1-3/16".
2. THE NEXTGEN2™ SHALL BE MAGNI 363 COATED PER ASTM F2833 AS APPROPRIATE.
3. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
4. SHEAR SLEEVE MUST EXTEND BEYOND THE SHEAR PLANE.
5. SHIMS FOR MONOPOLE 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. ADJACENT SHIM PLATE THICKNESSES MAY TAPER IN INCREMENTS OF 1/16" AND SHALL BE NO LESS THAN 1/16". STACKING OF SHIMS IS PERMITTED. SHIMS GREATER THAN 1/4" IN THICKNESS LOCATED WITHIN THE TERMINATION LENGTH OF THE SHAFT REINFORCEMENT PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.

INSPECTION NOTES AND PROCEDURES:

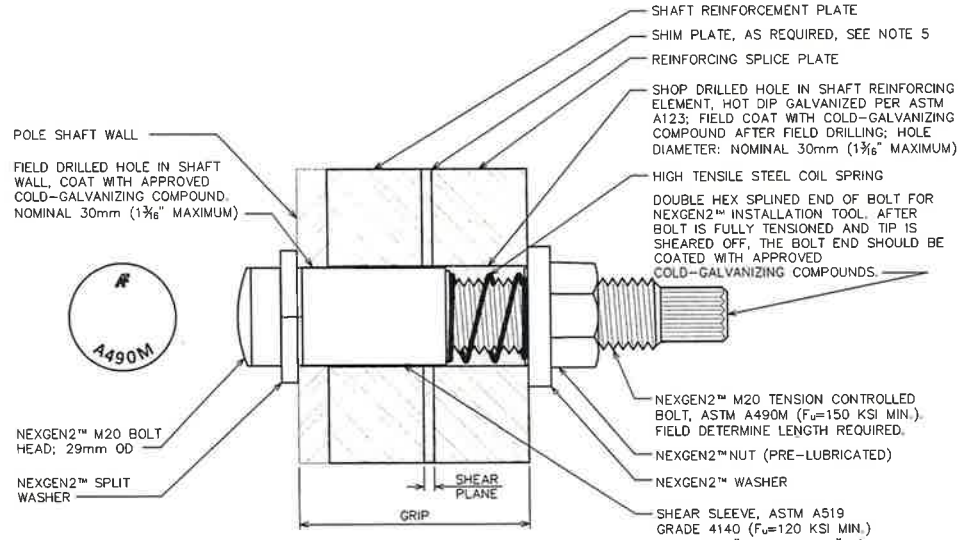
1. REVIEW STRUCTURAL DESIGN DRAWINGS.
2. VISUALLY INSPECT SHEARED BOLT ENDS TO ENSURE CORRECT TENSION WAS ACHEIVED.
3. VERIFY BOLT ENDS ARE SUFFICIENTLY COATED WITH APPROVED COLD-GALVANIZING COMPOUNDS.

INTERIOR OF POLE SHAFT

EXTERIOR OF POLE SHAFT



NEXGEN2 BOLT DETAILS



NEXGEN2 BOLT DETAILS

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
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DRAWN BY: EAJ | CHECKED BY: GJS

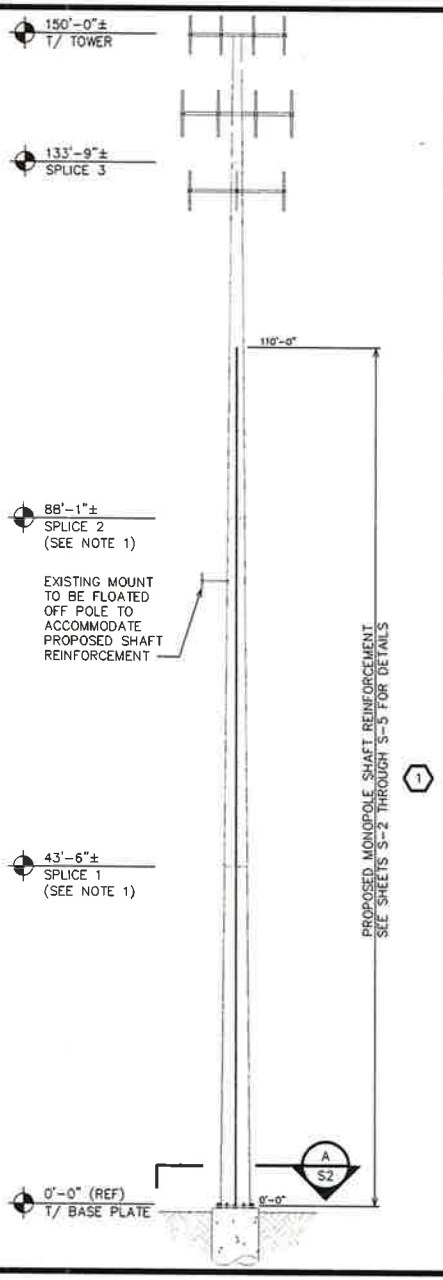
SHEET TITLE:

NEXGEN2 INSTALLATION DETAILS

SHEET NUMBER: **N-5**

REVISION: 0

TEP #: 25589.31758



POLE SPECIFICATIONS

POLE SHAPE TYPE:	18-SIDED POLYGON
POLE SHAFT GRADE:	ASTM A572-65
BASE PLATE GRADE:	ASTM A871-60
ANCHOR BOLT GRADE:	ASTM A615-75

SHAFT SECTION	SECTION LENGTH (FT.)	SHAFT THICKNESS (IN.)	LAP SPLICE (FT.)	OUTER DIAMETER (IN.)	
				TOP	BOTTOM
1	16.29	0.188	2.58	13.000	16.650
2	48.21	0.313	3.83	15.696	26.380
3	48.42	0.375	5.00	24.905	35.620
4	48.50	0.375	-	33.764	44.500

MODIFICATION SCHEDULE

NO.	MODIFICATION DESCRIPTION	ELEVATION (FT.)
1	INSTALL PROPOSED MONOPOLE SHAFT REINFORCEMENT. SEE SHEETS S-2 THROUGH S-5 FOR DETAILS.	0 - 110
2	CROWN CASTLE WILL CONTRACT WITH A THIRD PARTY VENDOR TO PERFORM THE MODIFICATION INSPECTION. THE CONTRACTOR SHALL COORDINATE THE INSPECTION WITH THE MODIFICATION INSPECTOR AND CROWN CASTLE PROJECT MANAGER. SEE SHEET N-1 FOR DETAILS.	-

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY SPLICE ELEVATION PRIOR TO INSTALLATION. CONTACT TOWER OWNER AND ENGINEER OF RECORD IF SPLICE ELEVATIONS DIFFER FROM WHAT IS SHOWN. SHAFT REINFORCEMENT ELEVATIONS ARE DEPENDANT ON SPLICE ELEVATIONS AND MAY NEED TO BE ADJUSTED TO ACCOMMODATE ACTUAL SPLICE ELEVATION.
2. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO PROVIDE THE MODIFICATION INSPECTOR/ ENGINEER OF RECORD WITH A SEALED CERTIFIED WELD INSPECTION REPORT. THIS REPORT SHALL DOCUMENT THE ENTIRE WELDING PROCESS (PRE/DURING/POST) WITH PROPER PHOTOS. WELDING SHALL CONFORM TO AWS D1.1/D1.1M: 2000 "STRUCTURAL WELDING CODE-STEEL", FOR ADDITIONAL NOTES, SEE WELDING NOTES.
3. ANTENNAS AND OTHER APPURTENANCES MAY NEED TO BE TEMPORARILY REMOVED OR MOVED DURING THE INSTALLATION OF THE MODIFICATIONS SHOWN ABOVE.
4. NDE OF THE CIRCUMFERENTIAL WELD OF THE BASE PLATE TO SHAFT CONNECTION IS REQUIRED. PLEASE SEE ENG-SOW-10033 : TOWER BASE PLATE NDE AND ENG-BUL-10051 : NDE REQUIREMENTS FOR MONOPOLE BASEPLATE TO PREVENT CONNECTION FAILURE. NOTIFY THE EOR AND CROWN ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING MODIFICATIONS THAT HAVE BEEN WELDED TO THE BASE PLATE. FULL PENETRATION WELDING TO THE BASEPLATE REQUIRED AS PART OF THIS ACTIVE REINFORCEMENT DESIGN SHALL BE INCLUDED IN THE NDE SCOPE OF WORK.
5. PRIOR TO INSTALLATION OF THE REINFORCEMENT PLATES, THE CONTRACTOR SHALL ENSURE THE JOINT OVERLAP HAS BEEN PROPERLY ACHIEVED AT ALL SPLICE JOINTS, PER THE TOWER MANUFACTURER DRAWINGS. IF NOT ACHIEVED, JACKING OF THE TOWER WILL BE REQUIRED. CONTRACTOR SHALL REFERENCE TOWER MANUFACTURER'S INSTALLATION GUIDELINES FOR PREFERRED METHOD FOR JACKING MONOPOLE TUBE SECTION TOGETHER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS IN CONNECTION WITH THIS WORK.
6. DUE TO THE MODIFICATIONS REQUIRED, CONTINUOUS INSPECTIONS AND MATERIAL TESTING WILL NEED TO BE PERFORMED.
7. CONTRACTOR SHALL ORDER AND INSTALL A NEW TOWER TAG IF THE EXISTING TOWER TAG IS MOVED OR DAMAGED DUE TO THE INSTALLATION OF THE MODIFICATION SHOWN ABOVE.
8. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE TOWER OWNER OR ENGINEER OF RECORD.

ATTENTION

NO DETAILED INFORMATION REGARDING INTERFERENCES WAS PROVIDED. THEREFORE, CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSION BEFORE FABRICATING MATERIALS AND PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO TOWER ENGINEERING PROFESSIONALS, INC., AND CROWN CASTLE CONSTRUCTION MANAGER IMMEDIATELY.

0 16 32
SCALE IN FEET

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

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RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

TOWER ELEVATION AND MODIFICATION SCHEDULE

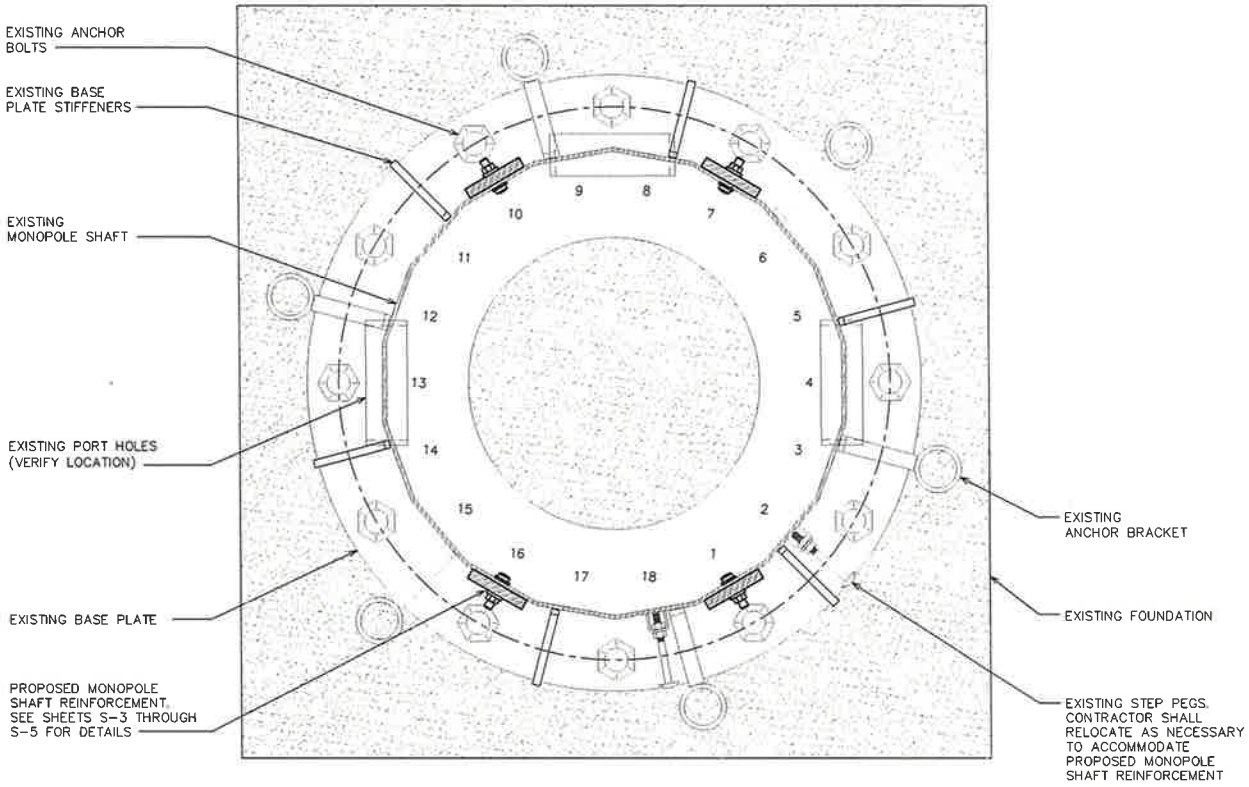
SHEET NUMBER: **S-1**

REVISION: **0**

TEP #: 25589.31758

ATTENTION

THE TOWER SAFETY CLIMB WAS ASSUMED TO BE LOCATED OFF FLAT 1. FIELD VERIFY SAFETY CLIMB AND STEP PEG LOCATION PRIOR TO INSTALLATION. CONTACT TOWER OWNER AND ENGINEER OF RECORD SHOULD ANY DISCREPANCIES ARISE. CONTRACTOR TO REMOVE AND RE-ATTACH SAFETY CLIMB AND STEP PEGS AS NECESSARY TO INSTALL PROPOSED REINFORCEMENT. IF STEP PEGS ARE REQUIRED TO BE ATTACHED TO PROPOSED REINFORCEMENT, IT SHALL BE DONE PRIOR TO GALVANIZATION.



SECTION (A)
SCALE: 1" = 1'-0"

0 1 2
SCALE IN FEET

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (980) 209-8253

PROJECT INFORMATION:

WESTBROOK / ORSINA
BU #: 876384

798 TOBY HILL ROAD
WESTBROOK, CT 06498
(MIDDLESEX COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

May 04, 2015

REV	DATE	ISSUED FOR:
1	05-04-15	REVISED MOD. DRAWINGS
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

BASE SECTION DETAILS

SHEET NUMBER: **S-2**

REVISION: 1

TEP #: 25589.31758

CROWN CASTLE 65KSI FLAT PLATE REINFORCEMENT SCHEDULE

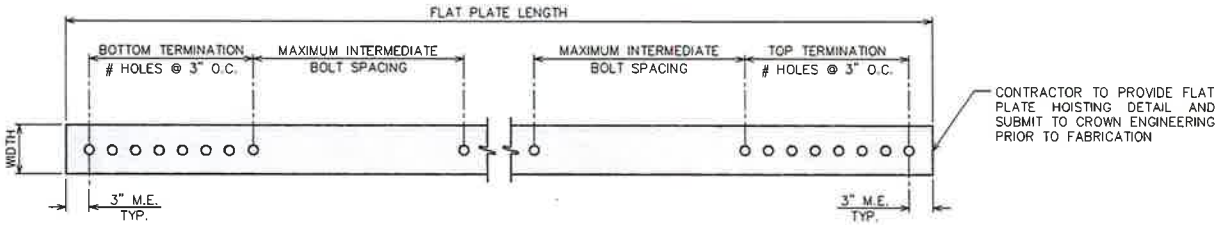
PART NUMBER	FLATS / ANGLES	BOTTOM ELEVATION (FT)	TOP ELEVATION (FT)	FLAT PLATE LENGTH (FT)	FLAT PLATE QUANTITY	TERMINATION BOLTS		MAXIMUM INTERMEDIATE BOLT SPACING (IN)	TOTAL BOLT QUANTITY	TOTAL STEEL WEIGHT (LB)	TERMINATION DETAIL	
						(BOT.)	(TOP)				(BOT.)	(TOP)
CCI-WSFP-06010035	10 16	0.00	35.00	35.00	2	-	8	16.00	64	1429.2	1	5
CCI-WSFP-06010030	1 7	0.00	30.00	30.00	2	-	8	16.00	56	1225.0	1	4
CCI-SFP-06010035	13	30.00	65.00	35.00	1	8	8	16.00	39	714.6	5	4
CCI-SFP-06010035	1 7	30.00	65.00	35.00	2	8	8	16.00	78	1429.2	4	4
CCI-SFP-06010020	1 7 13	65.00	85.00	20.00	3	8	8	16.00	81	1225.0	4	4
CCI-SFP-06010025	1 7 13	85.00	110.00	25.00	3	8	8	16.00	93	1531.3	4	3A
								TOTALS:	411	7554.2		

NOTES:

1. REFER TO SHEETS N-4 AND N-5 FOR BOLT INSTALLATION DETAILS.
2. SEE SHEETS S-4 AND S-5 FOR TERMINATION DETAILS.
3. ELEVATIONS ARE NOMINAL. REFERENCE STANDARD DETAILS FOR VARIATIONS IN TOP AND BOTTOM ELEVATIONS
4. 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. ADJACENT SHIMS PLATE THICKNESSES MAY TAPER IN INCREMENTS OF $\frac{1}{16}$" AND SHALL BE NO LESS THAN $\frac{1}{16}$". STACKING OF SHIMS IS PERMITTED. SHIMS GREATER THAN $\frac{1}{4}$" IN THICKNESS LOCATED WITHIN THE TERMINATION LENGTH OF THE SHAFT REINFORCEMENT PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.
5. FASTENER WEIGHT, SHIM PLATE WEIGHT, AND REINFORCING SPLICE PLATE WEIGHT NOT TABULATED IN THE TOTAL STEEL WEIGHTS.
6. ALL MATERIAL QUANTITIES ARE APPROXIMATE AND SHALL BE FIELD VERIFIED

CCI PART NUMBER FORMAT: CCI-|XXX|-|XXX|XXX|XX|
(SEE CHART; WIDTH; THICKNESS; LENGTH)

FLAT PLATE STANDARD NOMENCLATURE		NOTES
CCI-SFP	STANDARD FLAT PLATE	SEE CMRP 65 KSI PARTS CATALOG - 2ND EDITION AND THIS SHEET FOR DETAILS
CCI-WSFP	WELDABLE STANDARD FLAT PLATE	
CCI-AFP	AUXILIARY FLAT PLATE	
CCI-WAFP	WELDABLE AUXILIARY FLAT PLATE	
CCI-CFP	CUSTOM FLAT PLATE	SEE THIS SHEET FOR DETAILS
CCI-WCFP	WELDABLE CUSTOM FLAT PLATE	



TYPICAL FLAT PLATE REINFORCEMENT DETAIL

SCALE: N.T.S.

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SEAL:

GRAHAM E. ANDRES — 25539 — LICENSED PROFESSIONAL ENGINEER — CONNECTICUT

May 04, 2015

REV	DATE	ISSUED FOR:
1	05-04-15	REVISED MOD. DRAWINGS
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

SHAFT REINFORCEMENT DETAILS

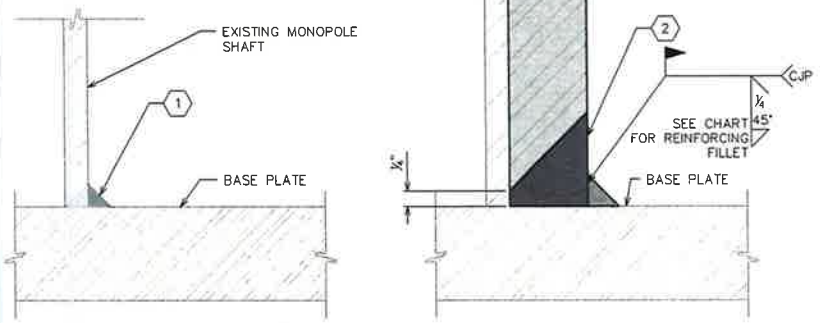
SHEET NUMBER: **S-3**

REVISION: 1

TEP #: 25589.31758

NOTES:

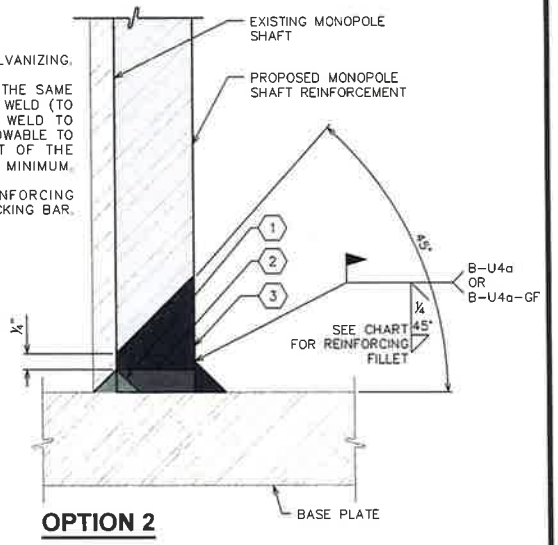
1. GRIND EXISTING FILLET WELD FLUSH TO BASE PLATE AND POLE FOR THE WIDTH OF THE REINFORCEMENT PLATE PLUS ¼" ON EACH SIDE (DO NOT OVER GRIND).
2. PERFORM CJP WELD WITH REINFORCING FILLET WELD USING POLE AS BACKING BAR.



OPTION 1

NOTES:

1. CLEAN EXISTING WELD FROM GALVANIZING.
2. BUILD PLATFORM WITH WELD AT THE SAME HEIGHT OF THE EXISTING FILLET WELD (TO REDUCE THE AMOUNT OF THE WELD TO BUILD THE PLATFORM, IT IS ALLOWABLE TO PARTIALLY GRIND THE HEIGHT OF THE EXISTING FILET WELD TO A ¼" MINIMUM.
3. PERFORM CJP WELD WITH REINFORCING FILLET WELD USING POLE AS BACKING BAR.



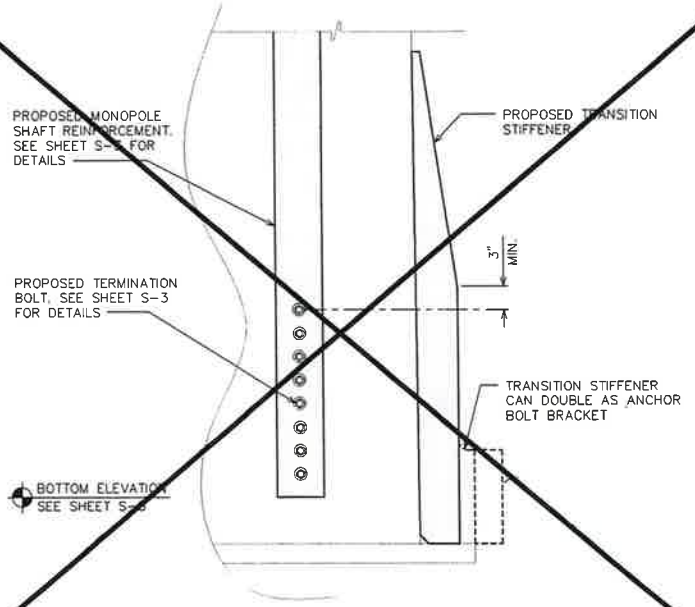
OPTION 2

BASE WELD TERMINATION DETAILS (1)

SCALE: N.T.S.

REINFORCING FILLET SIZE

PART NUMBER	PLATE SIZE	MINIMUM REINFORCING WELD
CCI-WSFP-040075 CCI-WAFP-040075 CCI-WCFP-040075	¾" x 4"	¼"
CCI-WSFP-045100 CCI-WAFP-045100 CCI-WCFP-045100	1" x 4½"	¼"
CCI-WSFP-060100 CCI-WAFP-060100 CCI-WCFP-060100	1" X 6"	⅜"
CCI-WSFP-065125 CCI-WAFP-065125 CCI-WCFP-065125	1¼" x 6½"	½"
CCI-WSFP-085125 CCI-WAFP-085125 CCI-WCFP-085125	1¼" X 8½"	⅝"



TRANSITION STIFFENER TERMINATION DETAILS (2)

SCALE: N.T.S.

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SEAL:

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DRAWN BY: EAJ | CHECKED BY: GJS

SHEET TITLE:

TYP. SHAFT REINFORCEMENT DETAILS I

SHEET NUMBER: **S-4**

REVISION: **0**

TEP #: 25589.31758