Robinson+Cole

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January 31, 2017

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

Re: **Notice of Exempt Modification – Facility Modification**
1358 New Britain Avenue, West Hartford, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 105-foot level on the existing 130-foot tower at 1358 New Britain Avenue in West Hartford (the "Property"). The tower is owned by Crown Castle. The Council approved Cellco's shared use of this tower in 1998. Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model SBNHH-1D65B, 700/2100 MHz antennas and three (3) model SBNHH-1D65B, 1900 MHz antennas, all at the same 105-foot level on the tower. Cellco also intends to replace six (6) remote radio heads ("RRHs") and install three (3) new RRHs, all behind its antennas and install two (2) HYBRIFLEX™ antenna cables, attached to the outside of the monopole. Included in Attachment 1 are specifications for the replacement antennas, RRHs and HYBRIFLEX™ cables.

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 Ronald Van Winkle, Town Manager for the Town of West Hartford. A copy of this letter is also being sent to Kevin M. Ahern, Chair of the West Hartford Town Plan and Zoning Commission, the West Hartford Methodist Church, owner of the Property and Crown Castle, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. The replacement antennas and RRHs will be located at the 105-foot level on the 130-foot tower.

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

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

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

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

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

A copy of the Town Assessor's Parcel Map and property owner information is included in Attachment 4.

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:
Ronald Van Winkle, Town Manager
Kevin M. Ahern, Chair Town Plan and Zoning Commission
West Hartford Methodist Church
Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

SBNHH-1D65B

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

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

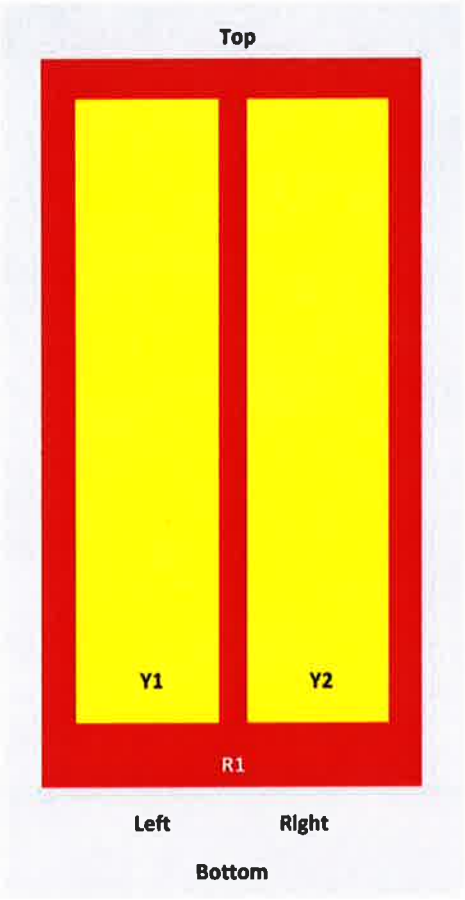
* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

Product Specifications

SBNHH-1D65B

SBNHH 65



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

View from the front of the antenna

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

General Specifications

Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage

Mechanical Specifications

RF Connector Quantity, total	6
RF Connector Quantity, low band	2
RF Connector Quantity, high band	4
RF Connector Interface	7-16 DIN Female

Product Specifications

SBNHH-1D65B

Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Loading, lateral	197.0 N @ 150 km/h 44.3 lbf @ 150 km/h
Wind Loading, rear	728.0 N @ 150 km/h 163.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Depth	180.0 mm | 7.1 in
Net Weight, without mounting kit	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

Length	2025.0 mm | 79.7 in
Width	390.0 mm | 15.4 in
Depth	296.0 mm | 11.7 in
Shipping Weight	31.0 kg | 68.3 lb

Regulatory Compliance/Certifications

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

Product Specifications

SBNHH-1D65B

Included Products

BSAMNT-1 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

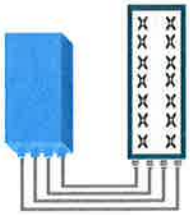
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

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

ALCATEL-LUCENT B25 RRH4X30

Alcatel-Lucent Band 25 Remote Radio Head 4x30W is the new addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B25 RRH4x30 allows operators to have a compact radio solution to deploy LTE in the PCS band (1.9 GHz, 3GPP band 25), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B25 RRH4x30 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity, LTE carriers from 3 MHz up to 20 MHz and up to 65 MHz instantaneous bandwidth.

The Alcatel-Lucent B25 RRH4x30 is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

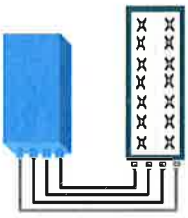
Its compactness and slim design makes the Alcatel-Lucent B25 RRH4x30 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 1.9 GHz band (PCS, 3GPP band 2 & 25)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- Ready for 3, 5, 10, 15 or 20MHz LTE carrier operation with 4Rx Diversity
- Ready to support up to 4 carriers anywhere in 65MHz instantaneous bandwidth
- Convection-cooled (fan-less)
- Supports AISG 2.0 devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in PCS band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Full flexibility for multiple carriers operation over entire PCS spectrum
- Improves downlink spectral efficiency and cell edge throughput through MIMO4
- Increases LTE coverage thanks to 4-way Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options (Pole or Wall)



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	3GPP bands 2 & 25 (PCS-G) DL: 1930 - 1995 MHz UL: 1850 - 1915 MHz
Instantaneous bandwidth - #carriers	65MHz – Up to 4 LTE carriers (in 40MHz occupied bandwidth)
LTE carrier bandwidth	3, 5, 10, 15 or 20 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure (3GPP band 2) **RX Diversity scheme**	2.0 dB typ. (<2.5 dB max) 2 or 4 way Rx diversity
Sizes (HxWxD)(w/ solar shield) in mm (in.) **Volume (w/ solar shield) in L** **Weight (w/ solar shield) in kg (lb)**	538 x 304 x 182 (21.2" x 12.0" x 7.2") 30 24 (53)
DC voltage range **DC power consumption**	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 580W typical @100% RF load
Environmental conditions **Wind load (@150km/h or 93mph)**	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5 (> 14dB)
CPRI ports	2 CPRI ports (HW ready for Rate7 / 9.8 Gbps)
AISG interfaces	1 AISG2.0 output (RS485), +24V/2A DC power Integrated Smart Bias Tees (x2)
Misc. Interfaces	1 external alarms connector (4 alarms) 4 RF Tx & 4 RF Rx monitor ports 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

ALCATEL-LUCENT B66A RRH4X45

The Alcatel-Lucent B66a Remote Radio Head 4x45 is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering. Its operational range covers beyond that of B4 (AWS) and B10 (AWS+).

Supporting 2Tx/4Tx MIMO and 2-way/4-way Rx diversity, the Alcatel-Lucent B66a RRH4x45 allows operators to have a compact radio solution to deploy LTE in the 2100 band (3GPP band 4, 10, and 66), providing them with the means to achieve high capacity, high quality, high reliability, large instantaneous bandwidth, and high coverage with minimum site requirements.

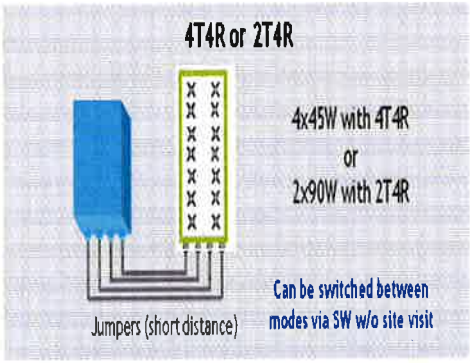
The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

The Alcatel-Lucent B66a RRH4x45 is a compact (near zero-footprint) solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

Its compactness and slim design makes the Alcatel-Lucent B66a RRH4x45 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 2110 - 2180 MHz band/DL, 1710-1780MHz/UL (3GPP band 4, 10, and 66a)
- LTE 2Tx or 4Tx MIMO (SW selectable)
- Configuration: 2T2R/2T4R/4T4R
- Output power: Up to 2x90W or 4x45W (SW configurable)
- 70MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports



BENEFITS

- Compact to reduce additional footprint when adding LTE in AWS 1-3 band
- Selection of MIMO configuration (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through 4Tx MIMO
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall

TECHNICAL SPECIFICATIONS

Features & Performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R selectable by SW)
Frequency band	AWS 1-3, B4/B66a DL: 2110-2180 MHz / UL: 1710-1780 MHz
Instantaneous bandwidth - #carriers	70 MHz – 4 LTE MIMO carriers (in 70 MHz occupied bandwidth)
LTE carrier bandwidth	5, 10, 15, 20 MHz
RF output power	2x90W or 4x45W (selectable by SW)
Noise figure – RX Diversity scheme **Receiver Sensivity (FRC A1-3)**	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity -104.5 dBm maximum
Sizes (HxWxD) in mm (in.) **Volume in Liters** **Weight in kg (lb) (w/o mounting HW)**	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield) 35.5 (with solar shield) 29.7 (without solar shield) 25.8kg (56.8lb) (with solar shield)
DC voltage range **DC power consumption**	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
Environmental conditions **Wind load (@150km/h or 93mph)**	-40°C (-40°F) /+55°C (+131°F) UL50E Type 4 Enclosure 250N (56lb) Frontal/150N (34lb) Lateral
Antenna ports	4 ports 4.3-10 female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate 7, 9.8 Gbps) SFP: SMDF (HW supports also SMSF and MMDF)
AISG interfaces	1 AISG 2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-487 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27 / FCC Part 15 / GR-3178-CORE

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)

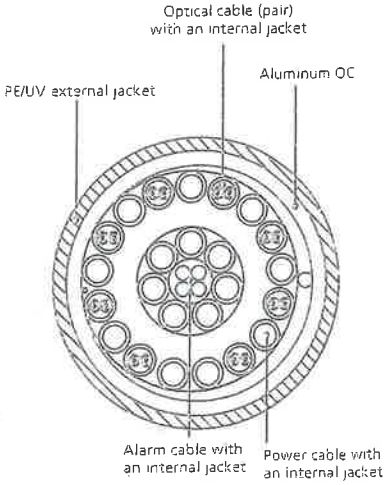


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Corbins Corner (West Hartford)								
Tower Height: 130'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Nextel	9	100	116	851	0.0267	0.5673	0.47%	
*Clearwire	2	153	125	2496	0.0078	1.0000	0.08%	
*Clearwire	1	211	125	23 GHz	0.0054	1.0000	0.05%	
*AT&T	4	275	95	1900	0.0499	1.0000	0.50%	
*Sprint	3	693	116	1900	0.0618	1.0000	0.62%	
*Sprint	1	390	116	850	0.0116	0.5667	0.20%	
*Sprint	2	693	116	2500	0.0412	1.0000	0.41%	
*MetroPCS CDMA	3	727	96	2135	0.0968	1.0000	0.97%	
*MetroPCS LTE	1	1200	96	2130	0.0533	1.0000	0.53%	
*VoiceStream	4	288	85	1930	0.0664	1.0000	0.66%	
Verizon	**1**	**4950**	**105**	**0.1614**	**1970**	**1.0000**	**16.14%**	
Verizon	**9**	**412**	**105**	**0.1209**	**869**	**0.5793**	**20.88%**	
Verizon	**1**	**7300**	**105**	**0.2381**	**2145**	**1.0000**	**23.81%**	
Verizon	**1**	**2200**	**105**	**0.0718**	**746**	**0.4973**	**14.43%**	
								79.8%
* Source: Siting Council								

ATTACHMENT 3

PJF PAUL J. FORD & COMPANY

Date: **December 1, 2016**

Steve Tuttle
Crown Castle
8 Parkmeadow Dr
Pittsford, NY 14354
585.899.3445

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

Subject: Structural Modification Report

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Corbins Corner, CT
Crown Castle Designation:	**Crown Castle BU Number:**	876324
	Crown Castle Site Name:	WEST HARTFORD UNITED METHODIST
	Crown Castle JDE Job Number:	392790
	Crown Castle Work Order Number:	1322500
	Crown Castle Application Number:	356075 Rev. 2
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37516-3041.002.7700
Site Data:	**1358 New Britain Avenue, WEST HARTFORD, Hartford County, CT**	
	Latitude *41° 43' 50.37"*, Longitude *-72° 45' 13.17"*	
	130 Foot - Monopole Tower	

Dear Steve Tuttle,

Paul J Ford and Company is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 967284, in accordance with application 356075, revision 2.

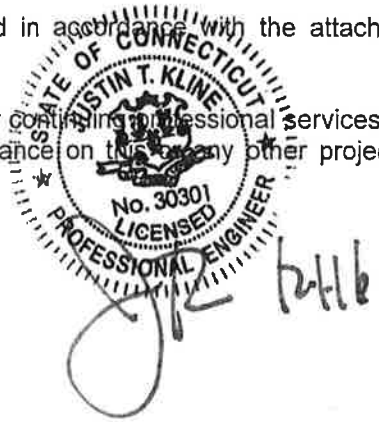
The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

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

This analysis has been performed in accordance with the 2012 International Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per section 1609.3.1 as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II, Exposure Category C and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1.0 were used in this analysis.

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

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



Respectfully submitted by:

Richard W. Hoffman, P.E.
Project Manager

tnxTower Report - version 7.0.5.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 130 ft Monopole tower designed by ROHN in January of 1997. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-E.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2012 International Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per section 1609.3.1 as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II, Exposure Category C and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1.0 were used in this analysis.

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
105.0	105.0	3	alcatel lucent	RRH2X60-PCS	2 (E)	1-5/8	1
		3	alcatel lucent	RRH2x60-700			
		3	alcatel lucent	RRH4X45-AWS4 B66			
		6	commscope	SBNHH-1D65B w/ Mount Pipe			
		2	rfs celwave	DB-T1-6Z-8AB-0Z			

Notes:
1) Proposed Equipment
(E) Coax mounted externally and exposed to the wind. See coax layout in Appendix B.

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
127.0	128.0	1	andrew	VHLP2-18	3 (C) 3 (C) 3 (E)	1/4 5/16 1/2	1
	127.0	3	argus technologies	LLPX310R w/ Mount Pipe			
		2	dragonwave	A-ANT-18G-2-C			
		1	raycap	DC6-48-60-18-8F			
		3	samsung telecommunications	RRH-2WB			
		1	tower mounts	Side Arm Mount [SO 101-3]			
117.0	117.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	-	-	1
		1	tower mounts	Side Arm Mount [SO 102-3]			
	115.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
116.0	116.0	3	alcatel lucent	TD-RRH8x20-25	1 (I) 3 (I)	3/4 1-1/4	1
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 502-1]			
105.0	105.0	3	alcatel lucent	RRH2x40-AWS	6 (I) 1 (I)	7/8 1-1/4	2
		3	antel	BXA-171063-12CF-EDIN-2 w/ Mount Pipe			
		1	raycap	RRFDC-3315-PF-48			
		3	remec	010-10021-1001			
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe			
		3	antel	BXA-70063/4CF w/ Mount Pipe	6 (I)	7/8	1
		3	antel	BXA-80063-4CF-EDIN-2 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 502-1]			
96.0	96.0	3	rfs celwave	APXV18-209015-C-A20	6 (I)	1-5/8	1
		1	tower mounts	Pipe Mount [PM 602-3]			
60.0	60.0	2	tower mounts	Side Arm Mount [SO 701-1]	-	-	1
50.0	50.0	1	lucent	KS24019-L112A	1 (E)	1/2	1
		1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Equipment To Be Removed
(E) Coax mounted externally and exposed to the wind. See coax layout in Appendix B.
(I) Coax mounted internally and shielded from the wind. See coax layout in Appendix B.
(C) Coax mounted inside a 2" conduit and shielded from the wind. See coax layout in Appendix B.

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	SEA Consultants, 96664.03H, 12/4/1996	1529734	CCISITES
4-POST-MODIFICATION INSPECTION #1	Vertical Solutions, 080497.15, 11/25/2008	2364340	CCISITES
4-POST-MODIFICATION INSPECTION #2	Sabre, 11-05047, 11/3/2010	2745780	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Rohn, 34738SW, 1/13/1997	1615437	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Rohn, 34738SW, 1/13/1997	1771422	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Monopole has been reinforced in conformance with the referenced modification drawings.
5) The existing top plate at 120' flange has been estimated as .75" thick from pictures on CCISITES. The grade has been assumed as A36 (36 ksi).

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	130 - 120	Pole	P16x0.1875	1	-0.91	342.69	11.3	Pass
L2	120 - 90	Pole	P24x0.25	2	-8.08	662.26	88.7	Pass
L3	90 - 83.5	Pole	P24x0.375	3	-9.01	1052.07	74.1	Pass
L4	83.5 - 75	Pole	P24x0.59485	4	-10.76	1398.64	70.5	Pass
L5	75 - 62	Pole	P24x0.59485	5	-13.54	1383.29	99.4	Pass
L6	62 - 60	Pole	RPS 24" x 1.23514"	6	-14.32	1776.06	83.1	Pass
L7	60 - 48.5	Pole	RPS 30" x 0.54289"	7	-19.16	1613.77	90.2	Pass
L8	48.5 - 30	Pole	RPS 30" x 0.77625"	8	-25.18	2270.56	87.9	Pass
L9	30 - 20.75	Pole	RPS 36" x 0.54611"	9	-30.68	2124.61	93.2	Pass
L10	20.75 - 17.75	Pole	RPS 36" x 0.68816"	10	-31.72	2101.07	94.2	Pass
L11	17.75 - 13	Pole	RPS 36" x 0.69167"	11	-33.38	2138.50	98.5	Pass
L12	13 - 12.5	Pole	RPS 36" x 0.78849"	12	-33.58	2585.03	82.2	Pass
L13	12.5 - 7	Pole	RPS 36" x 0.76863"	13	-35.69	2408.02	94.4	Pass
L14	7 - 2.75	Pole	RPS 36" x 0.78849"	14	-37.36	2585.03	92.6	Pass
L15	2.75 - 2	Pole	RPS 36" x 0.78849"	15	-37.66	2585.03	93.4	Pass
L16	2 - 0	Pole	RPS 36" x 0.68816"	16	-38.37	2522.93	97.6	Pass
							Summary	
						Pole (L5)	99.4	Pass
						RATING =	**99.4**	**Pass**

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

Notes	Component	Elevation (ft)	% Ca.pacity	Pass / Fail
1	Anchor Rods	0	86.1	Pass
1	Base Plate	0	87.4	Pass
1	Base Foundation Structural Steel	0	97.5	Pass
1	Base Foundation Soil Interaction	0	33.1	Pass
1	Flange Connection	30	79.8	Pass
1	Flange Connection	60	92.4	Pass
1	Flange Connection	90	61.3	Pass
1	Flange Connection	120	9.9	Pass

Structure Rating (max from all components) =	**99.4%**

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

4.1) Recommendations

Reinforce the pole as shown on the attached modification drawings.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.0000 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56.00 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	130.0000-120.0000	10.0000	P16x0.1875	A53-B-42 (42 ksi)	5.00
L2	115.0000-85.0000	30.0000	P24x0.25	A53-B-42 (42 ksi)	5.00

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L3	85.0000-78.5000	6.5000	P24x0.375	A53-B-42 (42 ksi)	5.00
L4	78.5000-70.0000	8.5000	P24x0.59485	Reinf 35.53 ksi (36 ksi)	5.00
L5	70.0000-57.0000	13.0000	P24x0.59485	Reinf 35.14 ksi (35 ksi)	5.00
L6	57.0000-55.0000	2.0000	RPS 24" x 1.23514"	Reinf 22.34 ksi (22 ksi)	5.00
L7	55.0000-43.5000	11.5000	RPS 30" x 0.54289"	Reinf 35.69 ksi (36 ksi)	5.00
L8	43.5000-25.0000	18.5000	RPS 30" x 0.77625"	Reinf 35.40 ksi (35 ksi)	5.00
L9	25.0000-15.7500	9.2500	RPS 36" x 0.54611"	Reinf 38.81 ksi (39 ksi)	5.00
L10	15.7500-12.7500	3.0000	RPS 36" x 0.68816"	Reinf 30.58 ksi (31 ksi)	5.00
L11	12.7500-8.0000	4.7500	RPS 36" x 0.69167"	Reinf 30.97 ksi (31 ksi)	5.00
L12	8.0000-7.5000	0.5000	RPS 36" x 0.78849"	Reinf 32.93 ksi (33 ksi)	5.00
L13	7.5000-2.0000	5.5000	RPS 36" x 0.76863"	Reinf 31.45 ksi (31 ksi)	5.00
L14	2.0000-2.2500	4.2500	RPS 36" x 0.78849"	Reinf 32.93 ksi (33 ksi)	5.00
L15	2.2500-1.5000	0.7500	RPS 36" x 0.78849"	Reinf 32.93 ksi (33 ksi)	5.00
L16	3.0000-1.0000	2.0000	RPS 36" x 0.68816"	Reinf 36.72 ksi (37 ksi)	

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 130.0000-120.0000				1	1	1			
L2 120.0000-90.0000				1	1	1			
L3 90.0000-83.5000				1	1	1			
L4 83.5000-75.0000				1	1	1			
L5 75.0000-62.0000				1	1	1			
L6 62.0000-60.0000				1	1	1			
L7 60.0000-48.5000				1	1	1			
L8 48.5000-30.0000				1	1	1			
L9 30.0000-20.7500				1	1	1			
L10 20.7500-17.7500				1	1	1			

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L11 17.7500-13.0000				1	1	1			
L12 13.0000-12.5000				1	1	1			
L13 12.5000-7.0000				1	1	1			
L14 7.0000-2.7500				1	1	1			
L15 2.7500-2.0000				1	1	1			
L16 2.0000-0.0000				1	1	1			

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
FSJ1-50A(1/4")	C	No	Inside Pole	127.0000 - 0.0000	3	No Ice	0.0000	0.04
						1/2" Ice	0.0000	0.04
						1" Ice	0.0000	0.04
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	3	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.76
						1" Ice	0.0000	2.00
9207(5/16")	C	No	Inside Pole	127.0000 - 0.0000	3	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	1	No Ice	0.2375	0.72
						1/2" Ice	0.3375	2.48
						1" Ice	0.4375	4.84
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	1	No Ice	0.0000	0.72
						1/2" Ice	0.0000	2.48
						1" Ice	0.0000	4.84
****								
HB114-21U3M12-XXXF(1-1/4")	C	No	Inside Pole	116.0000 - 0.0000	3	No Ice	0.0000	1.22
						1/2" Ice	0.0000	1.22
						1" Ice	0.0000	1.22
WR-VG86T(3/4)	C	No	Inside Pole	116.0000 - 0.0000	1	No Ice	0.0000	0.53
						1/2" Ice	0.0000	0.53
						1" Ice	0.0000	0.53
****								
LCF78-50A(7/8")	C	No	Inside Pole	105.0000 - 0.0000	6	No Ice	0.0000	0.34
						1/2" Ice	0.0000	0.34
						1" Ice	0.0000	0.34
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	105.0000 - 0.0000	2	No Ice	0.0000	1.30
						1/2" Ice	0.0000	2.81
						1" Ice	0.0000	4.94
***								
AVA7-50(1-5/8)	C	No	Inside Pole	96.0000 - 0.0000	6	No Ice	0.0000	0.70
						1/2" Ice	0.0000	0.70
						1" Ice	0.0000	0.70
***								
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	50.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.84
						1" Ice	0.0000	2.14
***								
***								
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	20.5000 - 0.0000	1	No Ice	0.2083	0.00
						1/2" Ice	0.3194	0.00
						1" Ice	0.4306	0.00
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	50.0000 - 36.0000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	85.6000 - 75.6000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00
***								
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	24.7500 - 0.0000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	55.7500 - 36.0000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	75.6000 - 65.0000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	130.0000-120.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.663	0.02
L2	120.0000-90.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	7.125	0.27
L3	90.0000-83.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.894	0.10
L4	83.5000-75.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.435	0.13
L5	75.0000-62.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.754	0.20
L6	62.0000-60.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.475	0.03
L7	60.0000-48.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.190	0.18
L8	48.5000-30.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	8.560	0.28
L9	30.0000-20.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.864	0.14
L10	20.7500-17.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.785	0.05
L11	17.7500-13.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.909	0.07
L12	13.0000-12.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.306	0.01
L13	12.5000-7.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.369	0.08
L14	7.0000-2.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.603	0.07
L15	2.7500-2.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.459	0.01
L16	2.0000-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	0.000	1.225	0.03

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	130.0000-120.0000	A	2.285	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.861	0.38
L2	120.0000-90.0000	A	2.245	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	20.598	2.15
L3	90.0000-83.5000	A	2.203	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	5.786	0.57
L4	83.5000-75.0000	A	2.183	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	11.270	0.73
L5	75.0000-62.0000	A	2.152	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	15.129	1.09
L6	62.0000-60.0000	A	2.127	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.326	0.17
L7	60.0000-48.5000	A	2.102	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.111	0.94
L8	48.5000-30.0000	A	2.035	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	27.395	1.55
L9	30.0000-20.7500	A	1.948	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	8.199	0.73
L10	20.7500-17.7500	A	1.895	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	5.344	0.23
L11	17.7500-13.0000	A	1.853	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	8.581	0.36
L12	13.0000-12.5000	A	1.819	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.892	0.04
L13	12.5000-7.0000	A	1.770	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	9.644	0.39
L14	7.0000-2.7500	A	1.652	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	7.127	0.28
L15	2.7500-2.0000	A	1.537	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.202	0.05
L16	2.0000-0.0000	A	1.410	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.042	0.11

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	130.0000-	-0.1920	0.1109	-0.3827	0.2209

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
	120.0000				
L2	120.0000-90.0000	-0.2758	0.1592	-0.5828	0.3365
L3	90.0000-83.5000	-0.3304	0.1907	-0.7100	0.4099
L4	83.5000-75.0000	-0.4368	0.2522	-0.9336	0.5390
L5	75.0000-62.0000	-0.4016	0.2319	-0.8584	0.4956
L6	62.0000-60.0000	-0.2758	0.1592	-0.5707	0.3295
L7	60.0000-48.5000	-0.4131	0.2385	-0.9279	0.5357
L8	48.5000-30.0000	-0.5072	0.2928	-1.1132	0.6427
L9	30.0000-20.7500	-0.3645	0.2105	-0.8203	0.4736
L10	20.7500-17.7500	-0.6451	0.3725	-1.3619	0.7863
L11	17.7500-13.0000	-0.6608	0.3815	-1.3763	0.7946
L12	13.0000-12.5000	-0.6608	0.3815	-1.3669	0.7892
L13	12.5000-7.0000	-0.6608	0.3815	-1.3535	0.7815
L14	7.0000-2.7500	-0.6608	0.3815	-1.3197	0.7619
L15	2.7500-2.0000	-0.6608	0.3815	-1.2857	0.7423
L16	2.0000-0.0000	-0.6608	0.3815	-1.2464	0.7196

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
LLPX310R w/ Mount Pipe	A	From Leg	1.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice	4.4352 4.7629 5.0990	2.8484 3.3668 3.9019	0.04 0.08 0.12
LLPX310R w/ Mount Pipe	B	From Leg	1.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice	4.4352 4.7629 5.0990	2.8484 3.3668 3.9019	0.04 0.08 0.12
LLPX310R w/ Mount Pipe	C	From Leg	1.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice	4.4352 4.7629 5.0990	2.8484 3.3668 3.9019	0.04 0.08 0.12
RRH-2WB	A	From Leg	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice	2.3047 2.4961 2.6949	0.7831 0.9170 1.0579	0.04 0.06 0.08
RRH-2WB	B	From Leg	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice	2.3047 2.4961 2.6949	0.7831 0.9170 1.0579	0.04 0.06 0.08
RRH-2WB	C	From Leg	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice	2.3047 2.4961 2.6949	0.7831 0.9170 1.0579	0.04 0.06 0.08
DC6-48-60-18-8F	C	From Leg	4.0000 0.00 0.00	0.00	127.0000	No Ice 1/2" Ice 1" Ice	0.9167 1.4583 1.6431	0.9167 1.4583 1.6431	0.02 0.04 0.06
Side Arm Mount [SO 101-3]	C	None		0.00	127.0000	No Ice 1/2"	7.5000 8.9000	7.5000 8.9000	0.25 0.33

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						Ice	10.3000	10.3000	0.41
						1" Ice			
****									
800MHz 2X50W RRH W/FILTER	A	From Leg	2.0000 0.00 0.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice	2.0583 2.2398 2.4287	1.9317 2.1087 2.2931	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	B	From Leg	2.0000 0.00 0.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice	2.0583 2.2398 2.4287	1.9317 2.1087 2.2931	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	2.0000 0.00 0.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice	2.0583 2.2398 2.4287	1.9317 2.1087 2.2931	0.06 0.09 0.11
PCS 1900MHz 4x45W-65MHz	A	From Leg	2.0000 0.00 -2.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice	2.3218 2.5266 2.7388	2.2381 2.4407 2.6507	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	B	From Leg	2.0000 0.00 -2.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice	2.3218 2.5266 2.7388	2.2381 2.4407 2.6507	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	C	From Leg	2.0000 0.00 -2.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice	2.3218 2.5266 2.7388	2.2381 2.4407 2.6507	0.06 0.08 0.11
Side Arm Mount [SO 102-3]	C	None		0.00	117.0000	No Ice 1/2" Ice 1" Ice	3.0000 3.4800 3.9600	3.0000 3.4800 3.9600	0.08 0.11 0.14
****									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	8.2619 8.8215 9.3462	6.9458 8.1266 9.0212	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	8.2619 8.8215 9.3462	6.9458 8.1266 9.0212	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	8.2619 8.8215 9.3462	6.9458 8.1266 9.0212	0.08 0.15 0.23
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	6.5799 7.0306 7.4733	4.9591 5.7544 6.4723	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	6.5799 7.0306 7.4733	4.9591 5.7544 6.4723	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	6.5799 7.0306 7.4733	4.9591 5.7544 6.4723	0.08 0.13 0.19
TD-RRH8x20-25	A	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	4.0455 4.2975 4.5570	1.5345 1.7142 1.9008	0.07 0.10 0.13
TD-RRH8x20-25	B	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	4.0455 4.2975 4.5570	1.5345 1.7142 1.9008	0.07 0.10 0.13
TD-RRH8x20-25	C	From Leg	4.0000	0.00	116.0000	No Ice	4.0455	1.5345	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 0.00			1/2" Ice 1" Ice	4.2975 4.5570	1.7142 1.9008	0.10 0.13
Platform Mount [LP 502-1]	C	None		0.00	116.0000	No Ice 1/2" Ice 1" Ice	32.3472 45.6677 58.9882	32.3472 45.6677 58.9882	0.93 1.19 1.46
(2) 2.375" OD x 6' Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
(2) 2.375" OD x 6' Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
(2) 2.375" OD x 6' Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	116.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
****									
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	8.3995 8.9639 9.4943	7.0730 8.2637 9.1753	0.07 0.14 0.21
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	8.3995 8.9639 9.4943	7.0730 8.2637 9.1753	0.07 0.14 0.21
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	8.3995 8.9639 9.4943	7.0730 8.2637 9.1753	0.07 0.14 0.21
RRH2X60-PCS	A	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	2.2000 2.3926 2.5926	1.7233 1.9015 2.0870	0.06 0.08 0.10
RRH2X60-PCS	B	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	2.2000 2.3926 2.5926	1.7233 1.9015 2.0870	0.06 0.08 0.10
RRH2X60-PCS	C	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	2.2000 2.3926 2.5926	1.7233 1.9015 2.0870	0.06 0.08 0.10
RRH2x60-700	A	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	3.5002 3.7609 4.0285	1.8157 2.0519 2.2894	0.06 0.08 0.11
RRH2x60-700	B	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	3.5002 3.7609 4.0285	1.8157 2.0519 2.2894	0.06 0.08 0.11
RRH2x60-700	C	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	3.5002 3.7609 4.0285	1.8157 2.0519 2.2894	0.06 0.08 0.11
RRH4X45-AWS4 B66	A	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	2.6600 2.8781 3.1037	1.5861 1.7690 1.9588	0.06 0.08 0.11
RRH4X45-AWS4 B66	B	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	2.6600 2.8781 3.1037	1.5861 1.7690 1.9588	0.06 0.08 0.11
RRH4X45-AWS4 B66	C	From Leg	4.0000	0.00	105.0000	No Ice	2.6600	1.5861	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 0.00			1/2" Ice 1" Ice	2.8781 3.1037	1.7690 1.9588	0.08 0.11
DB-T1-6Z-8AB-0Z	A	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	4.8000 5.0704 5.3481	2.0000 2.1926 2.3926	0.04 0.08 0.12
DB-T1-6Z-8AB-0Z	B	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	4.8000 5.0704 5.3481	2.0000 2.1926 2.3926	0.04 0.08 0.12
BXA-80063-4CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	4.9453 5.3243 5.7120	3.6927 4.2947 4.9133	0.03 0.07 0.12
BXA-80063-4CF-EDIN-2 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	4.9453 5.3243 5.7120	3.6927 4.2947 4.9133	0.03 0.07 0.12
BXA-80063-4CF-EDIN-2 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	4.9453 5.3243 5.7120	3.6927 4.2947 4.9133	0.03 0.07 0.12
BXA-70063/4CF w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	4.9453 5.3243 5.7120	3.6158 4.2169 4.8343	0.03 0.07 0.12
BXA-70063/4CF w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	4.9453 5.3243 5.7120	3.6158 4.2169 4.8343	0.03 0.07 0.12
BXA-70063/4CF w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice	4.9453 5.3243 5.7120	3.6158 4.2169 4.8343	0.03 0.07 0.12
Platform Mount [LP 502-1]	C	None		0.00	105.0000	No Ice 1/2" Ice 1" Ice	32.3472 45.6677 58.9882	32.3472 45.6677 58.9882	0.93 1.19 1.46
****									
APXV18-209015-C-A20	A	From Leg	0.5000 0.00 0.00	0.00	96.0000	No Ice 1/2" Ice 1" Ice	5.0792 5.5299 5.9880	3.0375 3.4693 3.9086	0.03 0.05 0.08
APXV18-209015-C-A20	B	From Leg	0.5000 0.00 0.00	0.00	96.0000	No Ice 1/2" Ice 1" Ice	5.0792 5.5299 5.9880	3.0375 3.4693 3.9086	0.03 0.05 0.08
APXV18-209015-C-A20	C	From Leg	0.5000 0.00 0.00	0.00	96.0000	No Ice 1/2" Ice 1" Ice	5.0792 5.5299 5.9880	3.0375 3.4693 3.9086	0.03 0.05 0.08
Pipe Mount [PM 602-3]	C	None		0.00	96.0000	No Ice 1/2" Ice 1" Ice	7.6800 9.5000 11.3200	7.6800 9.5000 11.3200	0.28 0.35 0.43
****									
Side Arm Mount [SO 701-1]	A	From Leg	0.0000 0.00 0.00	60.00	60.0000	No Ice 1/2" Ice 1" Ice	0.8500 1.1400 1.4300	1.6700 2.3400 3.0100	0.07 0.08 0.09
Side Arm Mount [SO 701-1]	A	From Leg	0.0000 0.00 0.00	-60.00	60.0000	No Ice 1/2" Ice 1" Ice	0.8500 1.1400 1.4300	1.6700 2.3400 3.0100	0.07 0.08 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
****									
KS24019-L112A	B	From Leg	4.0000 0.00 0.00	60.00	50.0000	No Ice 1/2" Ice 1" Ice	0.1407 0.1979 0.2621	0.1407 0.1979 0.2621	0.01 0.01 0.01
Side Arm Mount [SO 701-1]	B	From Leg	0.0000 0.00 0.00	60.00	50.0000	No Ice 1/2" Ice 1" Ice	0.8500 1.1400 1.4300	1.6700 2.3400 3.0100	0.07 0.08 0.09
****									
Bridge Stiffener (111" x 11.5" x 1.25")	A	None		0.00	60.0000	No Ice 1/2" Ice 1" Ice	5.7600 2.9726 4.0305	13.1941 13.8937 14.6007	0.50 0.55 0.61
Bridge Stiffener (111" x 11.5" x 1.25")	B	None		0.00	60.0000	No Ice 1/2" Ice 1" Ice	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.40 0.44 0.48
Bridge Stiffener (111" x 11.5" x 1.25")	C	None		0.00	60.0000	No Ice 1/2" Ice 1" Ice	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.40 0.44 0.48
Channel Bridge Stiffener (44" x 6" x 1.25")	A	None		0.00	60.0000	No Ice 1/2" Ice 1" Ice	5.1400 2.8675 3.1481	0.7639 1.1554 1.4245	0.10 0.12 0.13
Channel Bridge Stiffener (44" x 6" x 1.25")	B	None		0.00	60.0000	No Ice 1/2" Ice 1" Ice	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.10 0.13 0.15
Channel Bridge Stiffener (44" x 6" x 1.25")	C	None		0.00	60.0000	No Ice 1/2" Ice 1" Ice	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.10 0.13 0.15
***									
Channel Bridge Stiffener (56" x 8" x 1.25")	A	None		0.00	30.0000	No Ice 1/2" Ice 1" Ice	6.5300 4.7047 5.0609	0.9722 1.5085 1.9609	0.10 0.12 0.15
Channel Bridge Stiffener (56" x 8" x 1.25")	B	None		0.00	30.0000	No Ice 1/2" Ice 1" Ice	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.40 0.44 0.48
Channel Bridge Stiffener (56" x 8" x 1.25")	C	None		0.00	30.0000	No Ice 1/2" Ice 1" Ice	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.40 0.44 0.48
Bridge Stiffener (135" x 11.5" x 1.25")	A	None		0.00	30.0000	No Ice 1/2" Ice 1" Ice	9.3900 3.6115 4.8916	16.7969 17.6335 18.4776	0.50 0.56 0.63
Bridge Stiffener (135" x 11.5" x 1.25")	B	None		0.00	30.0000	No Ice 1/2" Ice 1" Ice	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.50 0.56 0.63
Bridge Stiffener (135" x 11.5" x 1.25")	C	None		0.00	30.0000	No Ice 1/2" Ice 1" Ice	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.50 0.56 0.63
**									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP2-18	A	Paraboloid w/o Radome	From Leg	1.0000 0.00 1.00	30.00		127.0000	2.1750	No Ice 1/2" Ice 1" Ice	3.7200 4.0100 4.3000	0.03 0.05 0.07
A-ANT-18G-2-C	B	Paraboloid w/Radome	From Leg	1.0000 0.00 0.00	30.00		127.0000	2.1750	No Ice 1/2" Ice 1" Ice	3.7200 4.0100 4.3000	0.03 0.04 0.05
A-ANT-18G-2-C	C	Paraboloid w/Radome	From Leg	1.0000 0.00 0.00	30.00		127.0000	2.1750	No Ice 1/2" Ice 1" Ice	3.7200 4.0100 4.3000	0.03 0.04 0.05

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 130.0000-120.0000	125.0000	1.326	30.354	13.333	A	0.000	13.333	13.333	100.00	0.000	0.000
					B	0.000	13.333		100.00	0.000	0.000
					C	0.000	13.333		100.00	0.000	1.663
L2 120.0000-90.0000	105.0000	1.279	29.260	60.000	A	0.000	60.000	60.000	100.00	0.000	0.000
					B	0.000	60.000		100.00	0.000	0.000
					C	0.000	60.000		100.00	0.000	7.125
L3 90.0000-83.5000	86.7500	1.228	28.107	13.000	A	0.000	13.000	13.000	100.00	0.000	0.000
					B	0.000	13.000		100.00	0.000	0.000
					C	0.000	13.000		100.00	0.000	1.894
L4 83.5000-75.0000	79.2500	1.205	27.577	17.000	A	0.000	17.000	17.000	100.00	0.000	0.000
					B	0.000	17.000		100.00	0.000	0.000
					C	0.000	17.000		100.00	0.000	3.435
L5 75.0000-62.0000	68.5000	1.169	26.744	26.000	A	0.000	26.000	26.000	100.00	0.000	0.000
					B	0.000	26.000		100.00	0.000	0.000
					C	0.000	26.000		100.00	0.000	4.754
L6 62.0000-60.0000	61.0000	1.141	26.099	4.000	A	0.000	4.000	4.000	100.00	0.000	0.000
					B	0.000	4.000		100.00	0.000	0.000
					C	0.000	4.000		100.00	0.000	0.475
L7 60.0000-48.5000	54.2500	1.113	25.462	28.750	A	0.000	28.750	28.750	100.00	0.000	0.000
					B	0.000	28.750		100.00	0.000	0.000
					C	0.000	28.750		100.00	0.000	4.190
L8 48.5000-30.0000	39.2500	1.039	23.785	46.250	A	0.000	46.250	46.250	100.00	0.000	0.000
					B	0.000	46.250		100.00	0.000	0.000
					C	0.000	46.250		100.00	0.000	8.560
L9 30.0000-20.7500	25.3750	0.948	21.698	27.750	A	0.000	27.750	27.750	100.00	0.000	0.000
					B	0.000	27.750		100.00	0.000	0.000
					C	0.000	27.750		100.00	0.000	2.864
L10 20.7500-17.7500	19.2500	0.895	20.472	9.000	A	0.000	9.000	9.000	100.00	0.000	0.000
					B	0.000	9.000		100.00	0.000	0.000
					C	0.000	9.000		100.00	0.000	1.785
L11 17.7500-13.0000	15.3750	0.853	19.526	14.250	A	0.000	14.250	14.250	100.00	0.000	0.000
					B	0.000	14.250		100.00	0.000	0.000
					C	0.000	14.250		100.00	0.000	2.909
L12 13.0000-12.5000	12.7500	0.85	19.450	1.500	A	0.000	1.500	1.500	100.00	0.000	0.000
					B	0.000	1.500		100.00	0.000	0.000
					C	0.000	1.500		100.00	0.000	0.306
L13 12.5000-7.0000	9.7500	0.85	19.450	16.500	A	0.000	16.500	16.500	100.00	0.000	0.000
					B	0.000	16.500		100.00	0.000	0.000
					C	0.000	16.500		100.00	0.000	3.369
L14 7.0000-2.7500	4.8750	0.85	19.450	12.750	A	0.000	12.750	12.750	100.00	0.000	0.000
					B	0.000	12.750		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	12.750		100.00	0.000	2.603
L15 2.7500-2.0000	2.3750	0.85	19.450	2.250	A	0.000	2.250	2.250	100.00	0.000	0.000
					B	0.000	2.250		100.00	0.000	0.000
					C	0.000	2.250		100.00	0.000	0.459
L16 2.0000-0.0000	1.0000	0.85	19.450	6.000	A	0.000	6.000	6.000	100.00	0.000	0.000
					B	0.000	6.000		100.00	0.000	0.000
					C	0.000	6.000		100.00	0.000	1.225

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 130.0000-120.0000	125.0000	1.326	8.065	2.2849	17.142	A	0.000	17.142	17.142	100.00	0.000	0.000
						B	0.000	17.142		100.00	0.000	0.000
						C	0.000	17.142		100.00	0.000	4.861
L2 120.0000-90.0000	105.0000	1.279	7.774	2.2454	71.227	A	0.000	71.227	71.227	100.00	0.000	0.000
						B	0.000	71.227		100.00	0.000	0.000
						C	0.000	71.227		100.00	0.000	20.598
L3 90.0000-83.5000	86.7500	1.228	7.468	2.2030	15.387	A	0.000	15.387	15.387	100.00	0.000	0.000
						B	0.000	15.387		100.00	0.000	0.000
						C	0.000	15.387		100.00	0.000	5.786
L4 83.5000-75.0000	79.2500	1.205	7.327	2.1831	20.093	A	0.000	20.093	20.093	100.00	0.000	0.000
						B	0.000	20.093		100.00	0.000	0.000
						C	0.000	20.093		100.00	0.000	11.270
L5 75.0000-62.0000	68.5000	1.169	7.106	2.1515	30.662	A	0.000	30.662	30.662	100.00	0.000	0.000
						B	0.000	30.662		100.00	0.000	0.000
						C	0.000	30.662		100.00	0.000	15.129
L6 62.0000-60.0000	61.0000	1.141	6.934	2.1267	4.709	A	0.000	4.709	4.709	100.00	0.000	0.000
						B	0.000	4.709		100.00	0.000	0.000
						C	0.000	4.709		100.00	0.000	1.326
L7 60.0000-48.5000	54.2500	1.113	6.765	2.1019	32.779	A	0.000	32.779	32.779	100.00	0.000	0.000
						B	0.000	32.779		100.00	0.000	0.000
						C	0.000	32.779		100.00	0.000	13.111
L8 48.5000-30.0000	39.2500	1.039	6.320	2.0350	52.525	A	0.000	52.525	52.525	100.00	0.000	0.000
						B	0.000	52.525		100.00	0.000	0.000
						C	0.000	52.525		100.00	0.000	27.395
L9 30.0000-20.7500	25.3750	0.948	5.765	1.9481	30.753	A	0.000	30.753	30.753	100.00	0.000	0.000
						B	0.000	30.753		100.00	0.000	0.000
						C	0.000	30.753		100.00	0.000	8.199
L10 20.7500-17.7500	19.2500	0.895	5.440	1.8951	9.948	A	0.000	9.948	9.948	100.00	0.000	0.000
						B	0.000	9.948		100.00	0.000	0.000
						C	0.000	9.948		100.00	0.000	5.344
L11 17.7500-13.0000	15.3750	0.853	5.188	1.8529	15.717	A	0.000	15.717	15.717	100.00	0.000	0.000
						B	0.000	15.717		100.00	0.000	0.000
						C	0.000	15.717		100.00	0.000	8.581
L12 13.0000-12.5000	12.7500	0.85	5.168	1.8186	1.652	A	0.000	1.652	1.652	100.00	0.000	0.000
						B	0.000	1.652		100.00	0.000	0.000
						C	0.000	1.652		100.00	0.000	0.892
L13 12.5000-7.0000	9.7500	0.85	5.168	1.7704	18.123	A	0.000	18.123	18.123	100.00	0.000	0.000
						B	0.000	18.123		100.00	0.000	0.000
						C	0.000	18.123		100.00	0.000	9.644
L14 7.0000-2.7500	4.8750	0.85	5.168	1.6519	13.920	A	0.000	13.920	13.920	100.00	0.000	0.000
						B	0.000	13.920		100.00	0.000	0.000
						C	0.000	13.920		100.00	0.000	7.127
L15 2.7500-2.0000	2.3750	0.85	5.168	1.5373	2.442	A	0.000	2.442	2.442	100.00	0.000	0.000
						B	0.000	2.442		100.00	0.000	0.000
						C	0.000	2.442		100.00	0.000	1.202
L16 2.0000-0.0000	1.0000	0.85	5.168	1.4099	6.470	A	0.000	6.470	6.470	100.00	0.000	0.000
						B	0.000	6.470		100.00	0.000	0.000
						C	0.000	6.470		100.00	0.000	3.042

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 130.0000-120.0000	125.0000	1.326	10.391	13.333	A	0.000	13.333	13.333	100.00	0.000	0.000
					B	0.000	13.333		100.00	0.000	0.000
					C	0.000	13.333		100.00	0.000	1.663
L2 120.0000-90.0000	105.0000	1.279	10.017	60.000	A	0.000	60.000	60.000	100.00	0.000	0.000
					B	0.000	60.000		100.00	0.000	0.000
					C	0.000	60.000		100.00	0.000	7.125
L3 90.0000-83.5000	86.7500	1.228	9.622	13.000	A	0.000	13.000	13.000	100.00	0.000	0.000
					B	0.000	13.000		100.00	0.000	0.000
					C	0.000	13.000		100.00	0.000	1.894
L4 83.5000-75.0000	79.2500	1.205	9.441	17.000	A	0.000	17.000	17.000	100.00	0.000	0.000
					B	0.000	17.000		100.00	0.000	0.000
					C	0.000	17.000		100.00	0.000	3.435
L5 75.0000-62.0000	68.5000	1.169	9.155	26.000	A	0.000	26.000	26.000	100.00	0.000	0.000
					B	0.000	26.000		100.00	0.000	0.000
					C	0.000	26.000		100.00	0.000	4.754
L6 62.0000-60.0000	61.0000	1.141	8.935	4.000	A	0.000	4.000	4.000	100.00	0.000	0.000
					B	0.000	4.000		100.00	0.000	0.000
					C	0.000	4.000		100.00	0.000	0.475
L7 60.0000-48.5000	54.2500	1.113	8.717	28.750	A	0.000	28.750	28.750	100.00	0.000	0.000
					B	0.000	28.750		100.00	0.000	0.000
					C	0.000	28.750		100.00	0.000	4.190
L8 48.5000-30.0000	39.2500	1.039	8.142	46.250	A	0.000	46.250	46.250	100.00	0.000	0.000
					B	0.000	46.250		100.00	0.000	0.000
					C	0.000	46.250		100.00	0.000	8.560
L9 30.0000-20.7500	25.3750	0.948	7.428	27.750	A	0.000	27.750	27.750	100.00	0.000	0.000
					B	0.000	27.750		100.00	0.000	0.000
					C	0.000	27.750		100.00	0.000	2.864
L10 20.7500-17.7500	19.2500	0.895	7.008	9.000	A	0.000	9.000	9.000	100.00	0.000	0.000
					B	0.000	9.000		100.00	0.000	0.000
					C	0.000	9.000		100.00	0.000	1.785
L11 17.7500-13.0000	15.3750	0.853	6.684	14.250	A	0.000	14.250	14.250	100.00	0.000	0.000
					B	0.000	14.250		100.00	0.000	0.000
					C	0.000	14.250		100.00	0.000	2.909
L12 13.0000-12.5000	12.7500	0.85	6.659	1.500	A	0.000	1.500	1.500	100.00	0.000	0.000
					B	0.000	1.500		100.00	0.000	0.000
					C	0.000	1.500		100.00	0.000	0.306
L13 12.5000-7.0000	9.7500	0.85	6.659	16.500	A	0.000	16.500	16.500	100.00	0.000	0.000
					B	0.000	16.500		100.00	0.000	0.000
					C	0.000	16.500		100.00	0.000	3.369
L14 7.0000-2.7500	4.8750	0.85	6.659	12.750	A	0.000	12.750	12.750	100.00	0.000	0.000
					B	0.000	12.750		100.00	0.000	0.000
					C	0.000	12.750		100.00	0.000	2.603
L15 2.7500-2.0000	2.3750	0.85	6.659	2.250	A	0.000	2.250	2.250	100.00	0.000	0.000
					B	0.000	2.250		100.00	0.000	0.000
					C	0.000	2.250		100.00	0.000	0.459
L16 2.0000-0.0000	1.0000	0.85	6.659	6.000	A	0.000	6.000	6.000	100.00	0.000	0.000
					B	0.000	6.000		100.00	0.000	0.000
					C	0.000	6.000		100.00	0.000	1.225

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice

Comb. No.	Description
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	130 - 120	Pole	Max Tension	2	0.00	-0.00	-0.00
			Max. Compression	26	-3.65	0.75	-0.35
			Max. Mx	20	-0.91	14.61	-2.00
			Max. My	14	-0.91	1.13	-14.56
			Max. Vy	20	-2.20	14.61	-2.00
			Max. Vx	14	2.19	1.13	-14.56
			Max. Torque	12			-0.59
L2	120 - 90	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-28.59	1.61	-0.84
			Max. Mx	20	-8.10	344.67	-8.63
			Max. My	14	-8.09	4.34	-345.31
			Max. Vy	20	-16.54	344.67	-8.63
			Max. Vx	14	16.59	4.34	-345.31
			Max. Torque	12			-0.77

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L3	90 - 83.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-30.37	2.11	-1.13
			Max. Mx	20	-9.03	453.83	-9.95
			Max. My	14	-9.02	4.92	-454.78
			Max. Vy	20	-17.05	453.83	-9.95
			Max. Vx	14	17.10	4.92	-454.78
			Max. Torque	13			-0.62
L4	83.5 - 75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-33.24	2.75	-1.49
			Max. Mx	20	-10.77	602.20	-11.67
			Max. My	14	-10.77	5.69	-603.57
			Max. Vy	20	-17.86	602.20	-11.67
			Max. Vx	14	17.91	5.69	-603.57
			Max. Torque	13			-0.78
L5	75 - 62	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-37.59	3.69	-2.03
			Max. Mx	20	-13.54	841.19	-14.29
			Max. My	14	-13.54	6.85	-843.20
			Max. Vy	20	-18.89	841.19	-14.29
			Max. Vx	14	18.95	6.85	-843.20
			Max. Torque	13			-1.01
L6	62 - 60	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-38.62	3.83	-2.12
			Max. Mx	20	-14.33	879.12	-14.70
			Max. My	14	-14.32	7.03	-881.23
			Max. Vy	20	-19.04	879.12	-14.70
			Max. Vx	14	19.09	7.03	-881.23
			Max. Torque	13			-1.03
L7	60 - 48.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-46.28	4.57	-2.54
			Max. Mx	20	-19.17	1115.56	-16.94
			Max. My	14	-19.16	7.96	-1118.62
			Max. Vy	20	-21.11	1115.56	-16.94
			Max. Vx	14	21.16	7.96	-1118.62
			Max. Torque	13			-1.18
L8	48.5 - 30	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-54.74	6.15	-3.46
			Max. Mx	20	-25.18	1520.67	-20.66
			Max. My	14	-25.18	9.62	-1524.64
			Max. Vy	20	-22.65	1520.67	-20.66
			Max. Vx	14	22.70	9.62	-1524.64
			Max. Torque	13			-1.63
L9	30 - 20.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-62.87	6.98	-3.94
			Max. Mx	20	-30.68	1741.96	-22.52
			Max. My	14	-30.68	10.46	-1746.39
			Max. Vy	20	-24.21	1741.96	-22.52
			Max. Vx	14	24.26	10.46	-1746.39
			Max. Torque	13			-1.79
L10	20.75 - 17.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-64.31	7.24	-4.09
			Max. Mx	20	-31.72	1814.93	-23.11
			Max. My	14	-31.72	10.72	-1819.51
			Max. Vy	20	-24.45	1814.93	-23.11
			Max. Vx	14	24.50	10.72	-1819.51
			Max. Torque	13			-1.89
L11	17.75 - 13	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-66.57	7.64	-4.32
			Max. Mx	20	-33.38	1931.88	-24.05
			Max. My	14	-33.38	11.14	-1936.69
			Max. Vy	20	-24.81	1931.88	-24.05
			Max. Vx	14	24.86	11.14	-1936.69
			Max. Torque	13			-2.04
L12	13 - 12.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-66.83	7.68	-4.34
			Max. Mx	20	-33.58	1944.29	-24.15
			Max. My	14	-33.58	11.19	-1949.12
			Max. Vy	20	-24.84	1944.29	-24.15

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	14	24.89	11.19	-1949.12
			Max. Torque	13			-2.05
L13	12.5 - 7	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-69.60	8.11	-4.59
			Max. Mx	20	-35.69	2081.99	-25.22
			Max. My	14	-35.69	11.67	-2087.08
			Max. Vy	20	-25.24	2081.99	-25.22
			Max. Vx	14	25.29	11.67	-2087.08
			Max. Torque	13			-2.23
L14	7 - 2.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-71.73	8.42	-4.77
			Max. Mx	20	-37.36	2189.85	-26.05
			Max. My	14	-37.36	12.04	-2195.15
			Max. Vy	20	-25.53	2189.85	-26.05
			Max. Vx	14	25.58	12.04	-2195.15
			Max. Torque	13			-2.36
L15	2.75 - 2	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-72.10	8.47	-4.80
			Max. Mx	20	-37.66	2209.01	-26.20
			Max. My	14	-37.66	12.11	-2214.35
			Max. Vy	20	-25.58	2209.01	-26.20
			Max. Vx	14	25.63	12.11	-2214.35
			Max. Torque	13			-2.38
L16	2 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-72.97	8.59	-4.87
			Max. Mx	20	-38.37	2260.28	-26.58
			Max. My	14	-38.37	12.28	-2265.71
			Max. Vy	20	-25.70	2260.28	-26.58
			Max. Vx	14	25.76	12.28	-2265.71
			Max. Torque	13			-2.45

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	72.97	-0.00	0.00
	Max. H_x	20	38.38	25.69	-0.19
	Max. H_z	3	28.78	0.02	25.70
	Max. M_x	2	2260.04	0.02	25.70
	Max. M_z	8	2246.10	-25.59	-0.01
	Max. Torsion	25	2.04	12.80	22.26
	Min. Vert	21	28.78	25.69	-0.19
	Min. H_x	9	28.78	-25.59	-0.01
	Min. H_z	15	28.78	0.08	-25.74
	Min. M_x	14	-2265.71	0.08	-25.74
	Min. M_z	20	-2260.28	25.69	-0.19
	Min. Torsion	13	-2.45	-12.68	-22.44

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	31.98	-0.00	0.00	0.18	0.35	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	38.38	-0.02	-25.70	-2260.04	1.74	-1.76
0.9 Dead+1.6 Wind 0 deg - No Ice	28.78	-0.02	-25.70	-2240.77	1.63	-1.76
1.2 Dead+1.6 Wind 30 deg - No Ice	38.38	12.80	-22.27	-1959.48	-1124.51	-1.09

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
0.9 Dead+1.6 Wind 30 deg - No Ice	28.78	12.80	-22.27	-1942.67	-1114.94	-1.09
1.2 Dead+1.6 Wind 60 deg - No Ice	38.38	22.17	-12.83	-1128.96	-1946.75	-0.03
0.9 Dead+1.6 Wind 60 deg - No Ice	28.78	22.17	-12.83	-1119.30	-1930.12	-0.03
1.2 Dead+1.6 Wind 90 deg - No Ice	38.38	25.59	0.01	0.36	-2246.10	1.06
0.9 Dead+1.6 Wind 90 deg - No Ice	28.78	25.59	0.01	0.31	-2227.02	1.07
1.2 Dead+1.6 Wind 120 deg - No Ice	38.38	22.17	12.86	1130.35	-1946.54	1.88
0.9 Dead+1.6 Wind 120 deg - No Ice	28.78	22.17	12.86	1120.58	-1929.92	1.88
1.2 Dead+1.6 Wind 150 deg - No Ice	38.38	12.68	22.44	1981.86	-1106.74	2.44
0.9 Dead+1.6 Wind 150 deg - No Ice	28.78	12.68	22.44	1964.72	-1097.37	2.45
1.2 Dead+1.6 Wind 180 deg - No Ice	38.38	-0.08	25.74	2265.71	12.28	2.13
0.9 Dead+1.6 Wind 180 deg - No Ice	28.78	-0.08	25.74	2246.22	12.04	2.13
1.2 Dead+1.6 Wind 210 deg - No Ice	38.38	-12.80	22.26	1959.54	1125.14	1.26
0.9 Dead+1.6 Wind 210 deg - No Ice	28.78	-12.80	22.26	1942.62	1115.35	1.26
1.2 Dead+1.6 Wind 240 deg - No Ice	38.38	-22.15	12.94	1143.33	1945.38	0.09
0.9 Dead+1.6 Wind 240 deg - No Ice	28.78	-22.15	12.94	1133.41	1928.55	0.09
1.2 Dead+1.6 Wind 270 deg - No Ice	38.38	-25.69	0.19	26.58	2260.28	-0.93
0.9 Dead+1.6 Wind 270 deg - No Ice	28.78	-25.69	0.19	26.24	2240.65	-0.94
1.2 Dead+1.6 Wind 300 deg - No Ice	38.38	-22.17	-12.86	-1130.59	1947.01	-1.80
0.9 Dead+1.6 Wind 300 deg - No Ice	28.78	-22.17	-12.86	-1120.92	1930.17	-1.80
1.2 Dead+1.6 Wind 330 deg - No Ice	38.38	-12.80	-22.26	-1956.80	1123.97	-2.04
0.9 Dead+1.6 Wind 330 deg - No Ice	28.78	-12.80	-22.26	-1940.03	1114.22	-2.04
1.2 Dead+1.0 Ice+1.0 Temp	72.97	0.00	-0.00	4.87	8.59	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	72.97	-0.00	-9.03	-851.56	9.10	-0.96
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	72.97	4.50	-7.82	-737.30	-418.11	-0.57
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	72.97	7.80	-4.51	-423.02	-730.31	-0.01
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	72.97	9.00	0.00	5.02	-844.24	0.56
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	72.97	7.80	4.52	433.22	-730.29	0.98
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	72.97	4.48	7.86	752.58	-413.85	1.20
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	72.97	-0.02	9.04	862.69	11.60	1.04
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	72.97	-4.50	7.82	747.12	435.56	0.61
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	72.97	-7.79	4.53	436.32	747.27	0.02
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	72.97	-9.03	0.04	11.32	864.94	-0.53
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	72.97	-7.80	-4.52	-423.47	747.70	-0.97
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	72.97	-4.50	-7.82	-736.68	435.33	-1.11
Dead+Wind 0 deg - Service	31.98	-0.00	-5.50	-481.30	0.64	0.07
Dead+Wind 30 deg - Service	31.98	2.74	-4.76	-417.20	-239.24	0.03

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 60 deg - Service	31.98	4.74	-2.75	-240.31	-414.36	-0.01
Dead+Wind 90 deg - Service	31.98	5.47	0.00	0.21	-478.19	-0.03
Dead+Wind 120 deg - Service	31.98	4.74	2.75	240.88	-414.31	-0.05
Dead+Wind 150 deg - Service	31.98	2.71	4.80	422.25	-235.46	0.01
Dead+Wind 180 deg - Service	31.98	-0.02	5.51	482.74	2.88	0.01
Dead+Wind 210 deg - Service	31.98	-2.74	4.76	417.49	239.90	0.01
Dead+Wind 240 deg - Service	31.98	-4.74	2.77	243.64	414.60	0.02
Dead+Wind 270 deg - Service	31.98	-5.50	0.04	5.79	481.71	0.06
Dead+Wind 300 deg - Service	31.98	-4.74	-2.75	-240.66	414.94	0.06
Dead+Wind 330 deg - Service	31.98	-2.74	-4.76	-416.63	239.65	0.08

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-31.98	0.00	0.00	31.98	0.00	0.000%
2	-0.02	-38.38	-25.70	0.02	38.38	25.70	0.007%
3	-0.02	-28.78	-25.70	0.02	28.78	25.70	0.006%
4	12.80	-38.38	-22.27	-12.80	38.38	22.27	0.000%
5	12.80	-28.78	-22.27	-12.80	28.78	22.27	0.000%
6	22.17	-38.38	-12.83	-22.17	38.38	12.83	0.000%
7	22.17	-28.78	-12.83	-22.17	28.78	12.83	0.000%
8	25.59	-38.38	0.01	-25.59	38.38	-0.01	0.007%
9	25.59	-28.78	0.01	-25.59	28.78	-0.01	0.006%
10	22.17	-38.38	12.86	-22.17	38.38	-12.86	0.000%
11	22.17	-28.78	12.86	-22.17	28.78	-12.86	0.000%
12	12.68	-38.38	22.44	-12.68	38.38	-22.44	0.000%
13	12.68	-28.78	22.44	-12.68	28.78	-22.44	0.000%
14	-0.08	-38.38	25.74	0.08	38.38	-25.74	0.004%
15	-0.08	-28.78	25.74	0.08	28.78	-25.74	0.003%
16	-12.80	-38.38	22.26	12.80	38.38	-22.26	0.000%
17	-12.80	-28.78	22.26	12.80	28.78	-22.26	0.000%
18	-22.15	-38.38	12.94	22.15	38.38	-12.94	0.000%
19	-22.15	-28.78	12.94	22.15	28.78	-12.94	0.000%
20	-25.69	-38.38	0.19	25.69	38.38	-0.19	0.004%
21	-25.69	-28.78	0.19	25.69	28.78	-0.19	0.006%
22	-22.17	-38.38	-12.86	22.17	38.38	12.86	0.000%
23	-22.17	-28.78	-12.86	22.17	28.78	12.86	0.000%
24	-12.80	-38.38	-22.26	12.80	38.38	22.26	0.000%
25	-12.80	-28.78	-22.26	12.80	28.78	22.26	0.000%
26	0.00	-72.97	0.00	-0.00	72.97	0.00	0.001%
27	-0.00	-72.97	-9.03	0.00	72.97	9.03	0.001%
28	4.50	-72.97	-7.82	-4.50	72.97	7.82	0.000%
29	7.80	-72.97	-4.51	-7.80	72.97	4.51	0.000%
30	9.00	-72.97	0.00	-9.00	72.97	-0.00	0.001%
31	7.80	-72.97	4.52	-7.80	72.97	-4.52	0.000%
32	4.48	-72.97	7.86	-4.48	72.97	-7.86	0.000%
33	-0.02	-72.97	9.04	0.02	72.97	-9.04	0.001%
34	-4.50	-72.97	7.82	4.50	72.97	-7.82	0.000%
35	-7.80	-72.97	4.53	7.79	72.97	-4.53	0.000%
36	-9.03	-72.97	0.04	9.03	72.97	-0.04	0.001%
37	-7.80	-72.97	-4.52	7.80	72.97	4.52	0.000%
38	-4.50	-72.97	-7.82	4.50	72.97	7.82	0.000%
39	-0.00	-31.98	-5.50	0.00	31.98	5.50	0.012%
40	2.74	-31.98	-4.76	-2.74	31.98	4.76	0.002%
41	4.74	-31.98	-2.75	-4.74	31.98	2.75	0.002%
42	5.48	-31.98	0.00	-5.47	31.98	-0.00	0.002%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
43	4.74	-31.98	2.75	-4.74	31.98	-2.75	0.002%
44	2.71	-31.98	4.80	-2.71	31.98	-4.80	0.002%
45	-0.02	-31.98	5.51	0.02	31.98	-5.51	0.002%
46	-2.74	-31.98	4.76	2.74	31.98	-4.76	0.002%
47	-4.74	-31.98	2.77	4.74	31.98	-2.77	0.002%
48	-5.50	-31.98	0.04	5.50	31.98	-0.04	0.002%
49	-4.74	-31.98	-2.75	4.74	31.98	2.75	0.002%
50	-2.74	-31.98	-4.76	2.74	31.98	4.76	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00008788	0.00014072
3	Yes	15	0.00006090	0.00011730
4	Yes	20	0.00000001	0.00008567
5	Yes	19	0.00000001	0.00013796
6	Yes	20	0.00000001	0.00008621
7	Yes	19	0.00000001	0.00013896
8	Yes	15	0.00008796	0.00011045
9	Yes	15	0.00006096	0.00009353
10	Yes	20	0.00000001	0.00008767
11	Yes	19	0.00000001	0.00014139
12	Yes	20	0.00000001	0.00008385
13	Yes	19	0.00000001	0.00013487
14	Yes	16	0.00004209	0.00011274
15	Yes	16	0.00002881	0.00009125
16	Yes	20	0.00000001	0.00008807
17	Yes	19	0.00000001	0.00014194
18	Yes	20	0.00000001	0.00008724
19	Yes	19	0.00000001	0.00014053
20	Yes	16	0.00004210	0.00008704
21	Yes	15	0.00006088	0.00014072
22	Yes	20	0.00000001	0.00008461
23	Yes	19	0.00000001	0.00013626
24	Yes	20	0.00000001	0.00008784
25	Yes	19	0.00000001	0.00014161
26	Yes	11	0.00000001	0.00004494
27	Yes	18	0.00000001	0.00011333
28	Yes	19	0.00000001	0.00008504
29	Yes	19	0.00000001	0.00008544
30	Yes	18	0.00000001	0.00011189
31	Yes	19	0.00000001	0.00008783
32	Yes	19	0.00000001	0.00008557
33	Yes	18	0.00000001	0.00011515
34	Yes	19	0.00000001	0.00009016
35	Yes	19	0.00000001	0.00008954
36	Yes	18	0.00000001	0.00011499
37	Yes	19	0.00000001	0.00008673
38	Yes	19	0.00000001	0.00008915
39	Yes	15	0.00000001	0.00002632
40	Yes	15	0.00000001	0.00003331
41	Yes	15	0.00000001	0.00003268
42	Yes	15	0.00000001	0.00002605
43	Yes	15	0.00000001	0.00003150
44	Yes	15	0.00000001	0.00003277
45	Yes	15	0.00000001	0.00002634
46	Yes	15	0.00000001	0.00003341
47	Yes	15	0.00000001	0.00003242
48	Yes	15	0.00000001	0.00002623
49	Yes	15	0.00000001	0.00003388
50	Yes	15	0.00000001	0.00003097

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 120	18.57	44	1.20	0.00
L2	120 - 90	16.06	44	1.19	0.00
L3	90 - 83.5	8.93	44	1.00	0.00
L4	83.5 - 75	7.62	44	0.92	0.00
L5	75 - 62	6.07	44	0.83	0.00
L6	62 - 60	4.06	44	0.64	0.00
L7	60 - 48.5	3.80	44	0.62	0.00
L8	48.5 - 30	2.46	44	0.49	0.00
L9	30 - 20.75	0.92	44	0.29	0.00
L10	20.75 - 17.75	0.44	44	0.20	0.00
L11	17.75 - 13	0.33	44	0.17	0.00
L12	13 - 12.5	0.18	44	0.13	0.00
L13	12.5 - 7	0.17	44	0.12	0.00
L14	7 - 2.75	0.05	44	0.07	0.00
L15	2.75 - 2	0.01	44	0.03	0.00
L16	2 - 0	0.00	44	0.02	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
128.0000	VHLP2-18	44	18.07	1.20	0.00	493621
127.0000	A-ANT-18G-2-C	44	17.82	1.20	0.00	493621
117.0000	800MHz 2X50W RRH W/FILTER	44	15.30	1.19	0.00	43154
116.0000	APXVSPP18-C-A20 w/ Mount Pipe	44	15.05	1.18	0.00	32656
105.0000	(2) SBNHH-1D65B w/ Mount Pipe	44	12.34	1.13	0.00	8563
96.0000	APXV18-209015-C-A20	44	10.23	1.06	0.00	5318
60.0000	Side Arm Mount [SO 701-1]	44	3.80	0.62	0.00	4809
50.0000	KS24019-L112A	44	2.62	0.51	0.00	5456
30.0000	Channel Bridge Stiffener (56" x 8" x 1.25")	44	0.92	0.29	0.00	5295

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 120	87.10	12	5.65	0.01
L2	120 - 90	75.32	12	5.60	0.01
L3	90 - 83.5	41.91	12	4.69	0.01
L4	83.5 - 75	35.79	12	4.31	0.01
L5	75 - 62	28.49	12	3.88	0.01
L6	62 - 60	19.09	12	2.99	0.00
L7	60 - 48.5	17.86	12	2.90	0.00
L8	48.5 - 30	11.57	12	2.30	0.00
L9	30 - 20.75	4.34	12	1.39	0.00
L10	20.75 - 17.75	2.08	12	0.93	0.00
L11	17.75 - 13	1.54	12	0.81	0.00
L12	13 - 12.5	0.84	12	0.59	0.00
L13	12.5 - 7	0.78	12	0.57	0.00
L14	7 - 2.75	0.25	12	0.33	0.00
L15	2.75 - 2	0.04	12	0.14	0.00

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L16	2 - 0	0.02	12	0.11	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
128.0000	VHLP2-18	12	84.75	5.65	0.01	116144
127.0000	A-ANT-18G-2-C	12	83.57	5.64	0.01	116144
117.0000	800MHz 2X50W RRH W/FILTER	12	71.79	5.57	0.01	9668
116.0000	APXVSPP18-C-A20 w/ Mount Pipe	12	70.61	5.56	0.01	7243
105.0000	(2) SBNHH-1D65B w/ Mount Pipe	12	57.88	5.33	0.01	1857
96.0000	APXV18-209015-C-A20	12	48.03	5.00	0.01	1151
60.0000	Side Arm Mount [SO 701-1]	12	17.86	2.90	0.00	1029
50.0000	KS24019-L112A	12	12.31	2.38	0.00	1165
30.0000	Channel Bridge Stiffener (56" x 8" x 1.25")	12	4.34	1.39	0.00	1128

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	130 - 120 (1)	P16x0.1875	10.0000	0.0000	0.0	9.3143	-0.91	342.69	0.003
L2	120 - 90 (2)	P24x0.25	30.0000	0.0000	0.0	18.6532	-8.08	662.26	0.012
L3	90 - 83.5 (3)	P24x0.375	6.5000	0.0000	0.0	27.8325	-9.01	1052.07	0.009
L4	83.5 - 75 (4)	P24x0.59485	8.5000	0.0000	0.0	43.7390	-10.76	1398.64	0.008
L5	75 - 62 (5)	P24x0.59485	13.0000	0.0000	0.0	43.7390	-13.54	1383.29	0.010
L6	62 - 60 (6)	RPS 24" x 1.23514"	2.0000	0.0000	0.0	88.3346	-14.32	1776.06	0.008
L7	60 - 48.5 (7)	RPS 30" x 0.54289"	11.5000	0.0000	0.0	50.2403	-19.16	1613.77	0.012
L8	48.5 - 30 (8)	RPS 30" x 0.77625"	18.5000	0.0000	0.0	71.2668	-25.18	2270.56	0.011
L9	30 - 20.75 (9)	RPS 36" x 0.54611"	9.2500	0.0000	0.0	60.8266	-30.68	2124.61	0.014
L10	20.75 - 17.75 (10)	RPS 36" x 0.68816"	3.0000	0.0000	0.0	76.3413	-31.72	2101.07	0.015
L11	17.75 - 13 (11)	RPS 36" x 0.69167"	4.7500	0.0000	0.0	76.7231	-33.38	2138.50	0.016
L12	13 - 12.5 (12)	RPS 36" x 0.78849"	0.5000	0.0000	0.0	87.2229	-33.58	2585.03	0.013
L13	12.5 - 7 (13)	RPS 36" x 0.76863"	5.5000	0.0000	0.0	85.0740	-35.69	2408.02	0.015
L14	7 - 2.75 (14)	RPS 36" x 0.78849"	4.2500	0.0000	0.0	87.2229	-37.36	2585.03	0.014
L15	2.75 - 2 (15)	RPS 36" x 0.78849"	0.7500	0.0000	0.0	87.2229	-37.66	2585.03	0.015
L16	2 - 0 (16)	RPS 36" x 0.68816"	2.0000	0.0000	0.0	76.341	-38.37	2522.93	0.015

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
						3			

Pole Bending Design Data

Section No.	Elevation	Size	M_{ux}	ϕM_{nx}	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy}	ϕM_{ny}	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	ft		kip-ft	kip-ft		kip-ft	kip-ft	
L1	130 - 120 (1)	P16x0.1875	14.74	133.84	0.110	0.00	133.84	0.000
L2	120 - 90 (2)	P24x0.25	346.18	396.68	0.873	0.00	396.68	0.000
L3	90 - 83.5 (3)	P24x0.375	455.91	623.72	0.731	0.00	623.72	0.000
L4	83.5 - 75 (4)	P24x0.59485	605.02	868.52	0.697	0.00	868.52	0.000
L5	75 - 62 (5)	P24x0.59485	845.15	858.99	0.984	0.00	858.99	0.000
L6	62 - 60 (6)	RPS 24" x 1.23514"	883.26	1073.53	0.823	0.00	1073.53	0.000
L7	60 - 48.5 (7)	RPS 30" x 0.54289"	1121.07	1261.10	0.889	0.00	1261.10	0.000
L8	48.5 - 30 (8)	RPS 30" x 0.77625"	1527.79	1760.52	0.868	0.00	1760.52	0.000
L9	30 - 20.75 (9)	RPS 36" x 0.54611"	1749.88	1908.57	0.917	0.00	1908.57	0.000
L10	20.75 - 17.75 (10)	RPS 36" x 0.68816"	1823.10	1968.27	0.926	0.00	1968.27	0.000
L11	17.75 - 13 (11)	RPS 36" x 0.69167"	1940.46	2003.14	0.969	0.00	2003.14	0.000
L12	13 - 12.5 (12)	RPS 36" x 0.78849"	1952.91	2414.86	0.809	0.00	2414.86	0.000
L13	12.5 - 7 (13)	RPS 36" x 0.76863"	2091.07	2250.75	0.929	0.00	2250.75	0.000
L14	7 - 2.75 (14)	RPS 36" x 0.78849"	2199.28	2414.86	0.911	0.00	2414.86	0.000
L15	2.75 - 2 (15)	RPS 36" x 0.78849"	2218.51	2414.86	0.919	0.00	2414.86	0.000
L16	2 - 0 (16)	RPS 36" x 0.68816"	2269.94	2363.47	0.960	0.00	2363.47	0.000

Pole Shear Design Data

Section No.	Elevation	Size	Actual V_u	ϕV_n	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u	ϕT_n	Ratio $\frac{T_u}{\phi T_n}$
	ft		K	K		kip-ft	kip-ft	
L1	130 - 120 (1)	P16x0.1875	2.21	171.35	0.013	0.01	223.17	0.000
L2	120 - 90 (2)	P24x0.25	16.63	331.13	0.050	0.52	648.61	0.001
L3	90 - 83.5 (3)	P24x0.375	17.14	526.03	0.033	0.62	1019.71	0.001
L4	83.5 - 75 (4)	P24x0.59485	17.95	699.32	0.026	0.78	1331.03	0.001
L5	75 - 62 (5)	P24x0.59485	18.99	691.64	0.027	1.00	1316.42	0.001
L6	62 - 60 (6)	RPS 24" x 1.23514"	19.14	888.03	0.022	1.03	1602.66	0.001
L7	60 - 48.5 (7)	RPS 30" x 0.54289"	21.20	806.88	0.026	1.18	1945.53	0.001
L8	48.5 - 30 (8)	RPS 30" x 0.77625"	22.74	1135.28	0.020	1.63	2695.13	0.001
L9	30 - 20.75 (9)	RPS 36" x 0.54611"	24.30	1062.31	0.023	1.79	3091.70	0.001
L10	20.75 - 17.75 (10)	RPS 36" x 0.68816"	24.54	1050.53	0.023	1.88	3033.42	0.001
L11	17.75 - 13 (11)	RPS 36" x 0.69167"	24.90	1069.25	0.023	2.03	3086.86	0.001
L12	13 - 12.5 (12)	RPS 36" x 0.78849"	24.93	1292.51	0.019	2.05	3711.40	0.001
L13	12.5 - 7 (13)	RPS 36" x 0.76863"	25.33	1204.01	0.021	2.22	3461.08	0.001
L14	7 - 2.75 (14)	RPS 36" x 0.78849"	25.62	1292.51	0.020	2.36	3711.40	0.001
L15	2.75 - 2 (15)	RPS 36" x 0.78849"	25.67	1292.51	0.020	2.38	3711.40	0.001
L16	2 - 0 (16)	RPS 36" x 0.68816"	25.79	1261.46	0.020	2.44	3642.47	0.001

Pole Interaction Design Data

Section No.	Elevation	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	ft								

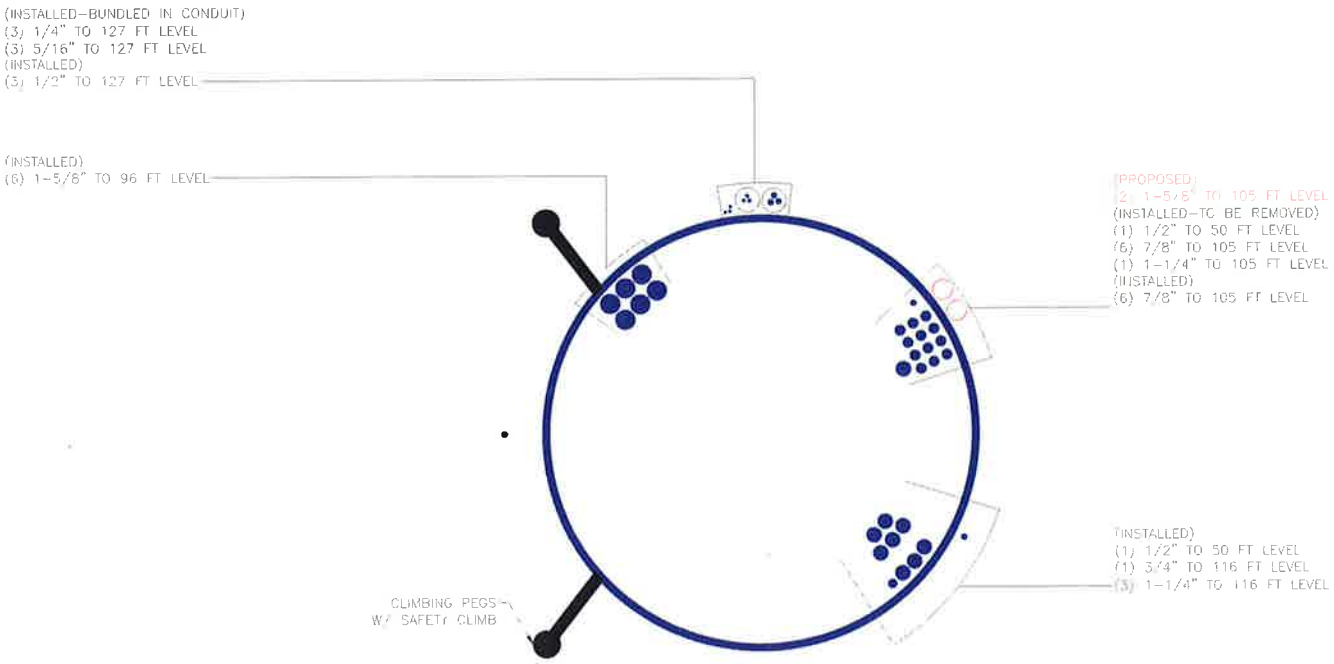
Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	130 - 120 (1)	0.003	0.110	0.000	0.013	0.000	0.113 ✔	1.000	4.8.2 ✔
L2	120 - 90 (2)	0.012	0.873	0.000	0.050	0.001	0.887 ✔	1.000	4.8.2 ✔
L3	90 - 83.5 (3)	0.009	0.731	0.000	0.033	0.001	0.741 ✔	1.000	4.8.2 ✔
L4	83.5 - 75 (4)	0.008	0.697	0.000	0.026	0.001	0.705 ✔	1.000	4.8.2 ✔
L5	75 - 62 (5)	0.010	0.984	0.000	0.027	0.001	0.994 ✔	1.000	4.8.2 ✔
L6	62 - 60 (6)	0.008	0.823	0.000	0.022	0.001	0.831 ✔	1.000	4.8.2 ✔
L7	60 - 48.5 (7)	0.012	0.889	0.000	0.026	0.001	0.902 ✔	1.000	4.8.2 ✔
L8	48.5 - 30 (8)	0.011	0.868	0.000	0.020	0.001	0.879 ✔	1.000	4.8.2 ✔
L9	30 - 20.75 (9)	0.014	0.917	0.000	0.023	0.001	0.932 ✔	1.000	4.8.2 ✔
L10	20.75 - 17.75 (10)	0.015	0.926	0.000	0.023	0.001	0.942 ✔	1.000	4.8.2 ✔
L11	17.75 - 13 (11)	0.016	0.969	0.000	0.023	0.001	0.985 ✔	1.000	4.8.2 ✔
L12	13 - 12.5 (12)	0.013	0.809	0.000	0.019	0.001	0.822 ✔	1.000	4.8.2 ✔
L13	12.5 - 7 (13)	0.015	0.929	0.000	0.021	0.001	0.944 ✔	1.000	4.8.2 ✔
L14	7 - 2.75 (14)	0.014	0.911	0.000	0.020	0.001	0.926 ✔	1.000	4.8.2 ✔
L15	2.75 - 2 (15)	0.015	0.919	0.000	0.020	0.001	0.934 ✔	1.000	4.8.2 ✔
L16	2 - 0 (16)	0.015	0.960	0.000	0.020	0.001	0.976 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	130 - 120	Pole	P16x0.1875	1	-0.91	342.69	11.3	Pass
L2	120 - 90	Pole	P24x0.25	2	-8.08	662.26	88.7	Pass
L3	90 - 83.5	Pole	P24x0.375	3	-9.01	1052.07	74.1	Pass
L4	83.5 - 75	Pole	P24x0.59485	4	-10.76	1398.64	70.5	Pass
L5	75 - 62	Pole	P24x0.59485	5	-13.54	1383.29	99.4	Pass
L6	62 - 60	Pole	RPS 24" x 1.23514"	6	-14.32	1776.06	83.1	Pass
L7	60 - 48.5	Pole	RPS 30" x 0.54289"	7	-19.16	1613.77	90.2	Pass
L8	48.5 - 30	Pole	RPS 30" x 0.77625"	8	-25.18	2270.56	87.9	Pass
L9	30 - 20.75	Pole	RPS 36" x 0.54611"	9	-30.68	2124.61	93.2	Pass
L10	20.75 - 17.75	Pole	RPS 36" x 0.68816"	10	-31.72	2101.07	94.2	Pass
L11	17.75 - 13	Pole	RPS 36" x 0.69167"	11	-33.38	2138.50	98.5	Pass
L12	13 - 12.5	Pole	RPS 36" x 0.78849"	12	-33.58	2585.03	82.2	Pass
L13	12.5 - 7	Pole	RPS 36" x 0.76863"	13	-35.69	2408.02	94.4	Pass
L14	7 - 2.75	Pole	RPS 36" x 0.78849"	14	-37.36	2585.03	92.6	Pass
L15	2.75 - 2	Pole	RPS 36" x 0.78849"	15	-37.66	2585.03	93.4	Pass
L16	2 - 0	Pole	RPS 36" x 0.68816"	16	-38.37	2522.93	97.6	Pass
							Summary	
						Pole (L5)	99.4	Pass
						RATING =	**99.4**	**Pass**

APPENDIX B

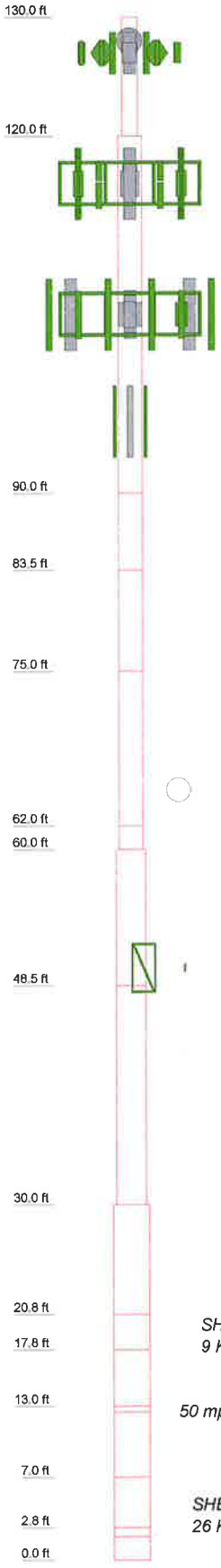
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Section	Size	Length (ft)	Socket Length (ft)	Grade	Weight (K)
1	P16x0.1875	10.0000	5.0000	A53-B-42	0.3
2	P24x0.25	30.0000	5.0000	A53-B-42	1.9
3	P24x0.375	6.5000	5.0000	A53-B-42	0.6
4	P24x0.59485	8.5000	5.0000	Reinf 35.53 ksi	1.3
5	P24x0.59485	13.0000	5.0000	Reinf 35.14 ksi	1.9
6	P24" x 1.23514	2.0000	5.0000	Reinf 22.34 ksi	0.6
7	RPS 30" x 0.5[illegible]	11.5000	5.0000	Reinf 35.69 ksi	2.0
8	RPS 30" x 0.77625"	18.5000	5.0000	Reinf 35.40 ksi	4.5
9	RPS 30" x 0.54611"	9.2500	5.0000	Reinf 38.81 ksi	1.9
10	RPS 30" x 0.[illegible]	3.0000	5.0000	Reinf 30.58 ksi	0.8
11	RPS 30" x 0.[illegible]	4.7500	5.0000	Reinf 30.58 ksi	1.2
12	RPS 30" x 0.[illegible]	0.5000	5.0000	Reinf 30.58 ksi	0.1
13	RPS 30" x 0.[illegible]	5.5000	5.0000	Reinf 30.58 ksi	1.6
14	RPS 30" x 0.[illegible]	2.0000	5.0000	Reinf 30.58 ksi	1.3
15	RPS 30" x 0.[illegible]	0.7500	5.0000	Reinf 30.58 ksi	0.2
16	RPS 30" x 0.[illegible]	0.5000	5.0000	Reinf 30.58 ksi	0.2
					20.8 0.2



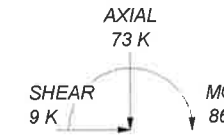
DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
LLPX310R w/ Mount Pipe	127	DB-T1-6Z-8AB-0Z	105
LLPX310R w/ Mount Pipe	127	BXA-80063-4CF-EDIN-2 w/ Mount Pipe	105
LLPX310R w/ Mount Pipe	127	BXA-80063-4CF-EDIN-2 w/ Mount Pipe	105
RRH-2WB	127	BXA-80063-4CF-EDIN-2 w/ Mount Pipe	105
RRH-2WB	127	BXA-70063/4CF w/ Mount Pipe	105
RRH-2WB	127	BXA-70063/4CF w/ Mount Pipe	105
DC6-48-60-18-8F	127	BXA-70063/4CF w/ Mount Pipe	105
Side Arm Mount [SO 101-3]	127	Platform Mount [LP 502-1]	105
VHLP2-18	127	(2) SBNHH-1D65B w/ Mount Pipe	105
A-ANT-18G-2-C	127	(2) SBNHH-1D65B w/ Mount Pipe	105
A-ANT-18G-2-C	127	(2) SBNHH-1D65B w/ Mount Pipe	105
PCS 1900MHz 4x45W-65MHz	117	Pipe Mount [PM 602-3]	96
PCS 1900MHz 4x45W-65MHz	117	APXV18-209015-C-A20	96
PCS 1900MHz 4x45W-65MHz	117	APXV18-209015-C-A20	96
Side Arm Mount [SO 102-3]	117	APXV18-209015-C-A20	96
800MHz 2X50W RRH W/FILTER	117	Bridge Stiffener (111" x 11.5" x 1.25")	60
800MHz 2X50W RRH W/FILTER	117	Bridge Stiffener (111" x 11.5" x 1.25")	60
800MHz 2X50W RRH W/FILTER	117	Bridge Stiffener (111" x 11.5" x 1.25")	60
APXVTM14-C-120 w/ Mount Pipe	116	Channel Bridge Stiffener (44" x 6" x 1.25")	60
APXVTM14-C-120 w/ Mount Pipe	116	Channel Bridge Stiffener (44" x 6" x 1.25")	60
APXVTM14-C-120 w/ Mount Pipe	116	Channel Bridge Stiffener (44" x 6" x 1.25")	60
TD-RRH8x20-25	116	Side Arm Mount [SO 701-1]	60
TD-RRH8x20-25	116	Side Arm Mount [SO 701-1]	60
TD-RRH8x20-25	116	Side Arm Mount [SO 701-1]	50
Platform Mount [LP 502-1]	116	KS24019-L112A	50
(2) 2.375" OD x 6' Mount Pipe	116	Bridge Stiffener (135" x 11.5" x 1.25")	30
(2) 2.375" OD x 6' Mount Pipe	116	Bridge Stiffener (135" x 11.5" x 1.25")	30
(2) 2.375" OD x 6' Mount Pipe	116	Bridge Stiffener (135" x 11.5" x 1.25")	30
APXVSPP18-C-A20 w/ Mount Pipe	116	Channel Bridge Stiffener (56" x 8" x 1.25")	30
APXVSPP18-C-A20 w/ Mount Pipe	116	Channel Bridge Stiffener (56" x 8" x 1.25")	30
APXVSPP18-C-A20 w/ Mount Pipe	116	Channel Bridge Stiffener (56" x 8" x 1.25")	30
RRH2X60-PCS	105		
RRH2X60-PCS	105		
RRH2X60-PCS	105		
RRH2x60-700	105		
RRH2x60-700	105		
RRH2x60-700	105		
RRH4X45-AWS4 B66	105		
RRH4X45-AWS4 B66	105		
RRH4X45-AWS4 B66	105		
DB-T1-6Z-8AB-0Z	105		

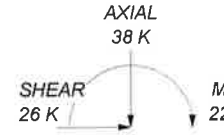
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi	Reinf 38.81 ksi	39 ksi	49 ksi
Reinf 35.53 ksi	36 ksi	45 ksi	Reinf 30.58 ksi	31 ksi	39 ksi
Reinf 35.14 ksi	35 ksi	44 ksi	Reinf 30.97 ksi	31 ksi	39 ksi
Reinf 22.34 ksi	22 ksi	28 ksi	Reinf 32.93 ksi	33 ksi	42 ksi
Reinf 35.69 ksi	36 ksi	45 ksi	Reinf 31.45 ksi	31 ksi	40 ksi
Reinf 35.40 ksi	35 ksi	45 ksi	Reinf 36.72 ksi	37 ksi	46 ksi

ALL REACTIONS ARE FACTORED



TORQUE 1 kip-ft
50 mph WIND - 1.0000 in ICE



TORQUE 2 kip-ft
REACTIONS - 97 mph WIND

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.0000 ft
8. TOWER RATING: 99.4%

Paul J. Ford & Company
250 E. Broad St, Suite 600
Columbus, OH 43215
Phone: (614) 221-6670
FAX: (614) 221-2540

Job: 130' Monopole / West Hartford, CT			
Project: PJF 37516-3041 / BU 876324			
Client: Crown Castle	Drawn by: Rich Hoffman	App'd:	
Code: TIA-222-G	Date: 12/01/16	Scale: N	
Path:		Dwg No.	

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250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

v4.1 - Effective 7-3-12

Date: 12/1/2016
PJF Project: 375816-3041.002.7700
Client Ref. # 876324
Site Name: West Hartford United Methodist
Description: Flange at 120'
Owner: Crown Castle
Engineer: RH

Asymmetric Bolt Analysis

Moment =	15.0	k-ft	TIA Ref.	G	Location =	Flange Plate		
Axial =	1.00	kips	ASIF =	N/A	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	3.00	kips	Max Ratio =	105.0%	Threads =	X-Excluded	for FP, Rev. G	
Anchor Qty =	9							

** For Flange Plates: Prying action is not considered in the bolt loads. **

Item	Nominal Bolt Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Bolt Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	0.750	A325	92	120	0.0	26.00	0.00	0.44	3.19	2.97	2.97	0.00	30.06	9.9%
2	0.750	A325	92	120	30.0	26.00	0.00	0.44	3.19	2.97	2.97	0.00	30.06	9.9%
3	0.750	A325	92	120	60.0	26.00	0.00	0.44	3.19	2.97	2.97	0.00	30.06	9.9%
4	0.750	A325	92	120	120.0	26.00	0.00	0.44	3.19	2.97	2.97	0.00	30.06	9.9%
5	0.750	A325	92	120	150.0	26.00	0.00	0.44	3.19	2.97	2.97	0.00	30.06	9.9%
6	0.750	A325	92	120	180.0	26.00	0.00	0.44	3.19	2.97	2.97	0.00	30.06	9.9%
7	0.750	A325	92	120	240.0	26.00	0.00	0.44	3.19	2.97	2.97	0.00	30.06	9.9%
8	0.750	A325	92	120	270.0	26.00	0.00	0.44	3.19	2.97	2.97	0.00	30.06	9.9%
9	0.750	A325	92	120	300.0	26.00	0.00	0.44	3.19	2.97	2.97	0.00	30.06	9.9%
								3.98						

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: 876324
Site Name:
App #:

Reactions adjusted to account for mouse hole configuration

Reactions		
Mu	19.846667	ft-kips
Axial, Pu:	1	kips
Shear, Vu:	3	kips
Elevation:	120	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
21.87

Pole Manufacturer:	Other

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	12		
Diameter (in.):	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	
N/A:		<-- Disregard	
Circle (in.):	26		

Plate Data		
Diam:	28	in
Thick, t:	0.75	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.75	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	24	in
Thick:	0.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,B1:	30.06	kips
Adjusted φ*Tn (due to Vu=Vu/Qty), B:	30.06	kips
Max Bolt directly applied Tu:	2.97	Kips
Min. PL "tc" for B cap. w/o Pry:	0.550	in
Min PL "treq" for actual T w/ Pry:	0.128	in
Min PL "t1" for actual T w/o Pry:	0.173	in
T allowable w/o Prying:	30.06	kips α'<0 case
Prying Force, q:	0.00	kips
Total Bolt Tension=Tu+q:	2.97	kips
Non-Prying Bolt Stress Ratio, Tu/B:	9.9%	Pass

Rigid
φ*Tn
φTn[(1-(Vu/φVn)^2]^0.5

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	2.4	ksi
Allowable Plate Stress:	32.4	ksi
Compression Plate Stress Ratio:	7.4%	Pass
No Prying		
Tension Side Stress Ratio, (treq/t)^2:	2.9%	Pass

Rigid
TIA G
φ*Fy
Comp. Y.L. Length:
10.00

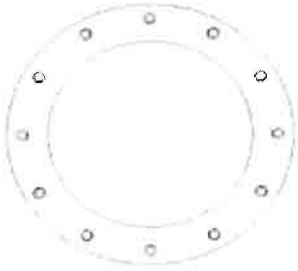
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: 876324
Site Name:
App #:

Reactions adjusted to account for mouse hole configuration

Reactions		
Mu	19.846667	ft-kips
Axial, Pu:	1	kips
Shear, Vu:	3	kips
Elevation:	120	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
21.87

Pole Manufacturer:	Other

If No stiffeners, Criteria: TIA G <-Only Applcable to Unstiffened Cases

Bolt Data

Qty:	12		
Diameter (in.):	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	
N/A:		<-- Disregard	
Circle (in.):	26		

Plate Data

Diam:	28	in
Thick, t:	1.5	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	4.19	in

Stiffener Data (Welding at Both Sides)

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

Pole Data

Diam:	16	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	65	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

			Non-Rigid
Bolt Tension Capacity, φ*Tn,**B1**:	30.06	kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	30.06	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	2.97	Kips	
Min. PL "tc" for **B** cap. **w/o Pry:**	1.506	in	
Min PL "treq" for actual **T w/ Pry:**	0.352	in	
Min PL "t1" for actual **T w/o Pry:**	0.473	in	
T allowable with Prying:	29.88	kips	0≤α'≤1 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	2.97	kips	
Prying Bolt Stress Ratio=(Tu+q)/(B):	9.9%	Pass	

Exterior Flange Plate Results Flexural Check

			Non-Rigid
Compression Side Plate Stress:	2.9	ksi	TIA G
Allowable Plate Stress:	45.0	ksi	φ*Fy
Compression Plate Stress Ratio:	6.4%	Pass	Comp. Y.L. Length:
No Prying			20.49
Tension Side Stress Ratio, (treq/t)^2:	5.5%	Pass	

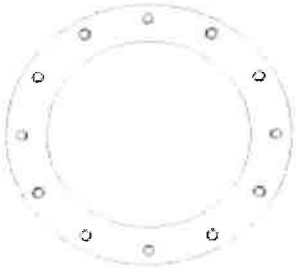
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *876324*
Site Name: *West Hartford United Meth*
App #:

Reactions		
Mu	346.2	ft-kips
Axial, Pu:	8.1	kips
Shear, Vu:	16.6	kips
Elevation:	90	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Pole Manufacturer:	Other

If No stiffeners, Criteria: TIA G <-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	20		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle (in.):	29		

Plate Data		
Diam:	32	in
Thick, t:	1.5	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.77	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	24	in
Thick:	0.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

			Rigid
Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.53	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	28.39	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.488	in	
Min PL "treq" for actual **T w/ Pry**:	0.819	in	
Min PL "t1" for actual **T w/o Pry**:	1.074	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	28.39	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	52.1%	Pass	

Exterior Flange Plate Results Flexural Check

			Rigid
Compression Side Plate Stress:	19.8	ksi	TIA G
Allowable Plate Stress:	32.4	ksi	φ*Fy
Compression Plate Stress Ratio:	61.3%	Pass	Comp. Y.L. Length:
No Prying			16.28
Tension Side Stress Ratio, (treq/t)^2:	29.8%	Pass	

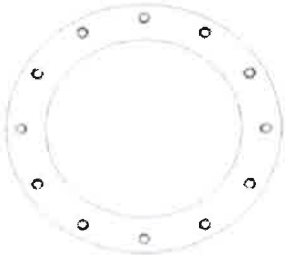
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *876324*
Site Name: *West Hartford United Meth*
App #:

Reactions		
Mu	346.2	ft-kips
Axial, Pu:	8.1	kips
Shear, Vu:	16.6	kips
Elevation:	90	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Pole Manufacturer:	Other

If No stiffeners, Criteria: TIA G <-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	20		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle (in.):	29		

Plate Data		
Diam:	32	in
Thick, t:	1.5	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.77	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	24	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	Rigid
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.53	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	28.39	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.488	in	
Min PL "treq" for actual **T w/ Pry**:	0.819	in	
Min PL "t1" for actual **T w/o Pry**:	1.074	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	28.39	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	52.1%	Pass	

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	19.8	ksi	Rigid
Allowable Plate Stress:	32.4	ksi	TIA G
Compression Plate Stress Ratio:	61.3%	Pass	φ*Fy
No Prying			Comp. Y.L. Length:
Tension Side Stress Ratio, (treq/t)^2:	29.8%	Pass	16.28

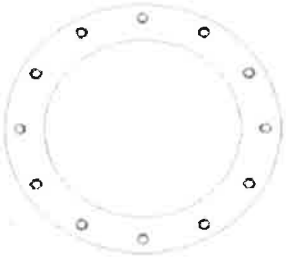
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



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

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

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v2.0, Effective Date: 1-12-12

Date: 12/1/2016
Project No: 37516-3041.002.7700
Site Name: West Hartford United Methodist
Site Number/BUN: 876324
Description:
Owner:
Engineer:

Welded Bridge Stiffener Analysis per TIA-222-G & AISC 13th Ed. (Black)

General Parameters and Loading:

Flange Elevation:	60.00	ft
TIA Reference Standard:	TIA-222-G	
AISC Manual:	13th Ed. (Black)	
Method:	LRFD	
ASD Stress Increase, ASIF:	N/A	
Moment, Muf:	883.3	k-ft
Axial, Puf:	14.3	kips
Shear, Vf:	19.1	kips

Pole Parameters:

	Upper Pole	Lower Pole	
Pole Diameter, Dp:	24.00	30.00	in
Pole Thickness, tp:	0.3750	0.3750	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	41.00	41.00	in

Bridge Stiffener Parameters:

	Stiffener Type 1	Stiffener Type 2	
Qty. Stiffeners:	3	0	
Upper Weld Length, L1:	48.00	0.00	in
Lower Weld Length, L2:	42.00	0.00	in
Weld Size, w:	0.2500	0.0000	in
Electrode:	E70	E70	
Effective Stiffener Width, Ws:	1.00	0.00	in
Stiffener Thickness, ts:	6.00	0.00	in
Notch, n:	1.83	0.00	in
Stiffener Fy:	65	0	ksi
Stiffener Fu:	80	0	ksi
Unbraced Length, L:	6.00	0.00	in
K:	0.80	0.00	
Stiffener Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Stiffener Circle:	45.66	41.00	in = Df + 2 n + Ws
Upper Eccentricity, e1:	10.83	8.50	in = (Df - Dp) / 2 + n + Ws / 2
Lower Eccentricity, e2:	7.83	5.50	in = (Df - Dp) / 2 + n + Ws / 2

Flange Bolt Parameters:

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	0	0	
Bolt Diameter:	0.00	0.00	in
Bolt Circle:	0.00	0.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Bolt Area, Ag:	0.0000	0.0000	in
Max. Tension:	0.00	0.00	kips
Max. Net Tension:	0.00	0.00	kips
Max. Net Compression:	0.00	0.00	kips
Moment to Bolt Circle:	0.00	0.00	k-ft
Axial to Bolt Circle:	0.00	0.00	kips
Shear to Bolt Circle:	0.00	0.00	kips
Equivalent Bolt Circle:	0.00	0.00	in

Weld Analysis per AISC Tables 8-4 & 8-3:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
D:	4	0	Num. of Sixteenths in Weld
a:	0.2256	0.0000	= e1 / L1
k:	0	0	
C:	3.4075	3.7100	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
Φ:	0.7500	0.7500	
Stiffener Axial, Pu:	314.1	0.0	kips
Axial Capacity, ΦPn:	490.7	0.0	kips = Φ C C1 D L
Ratio:	64.0%	0.0%	

Lower Pole	Stiffener Type 1	Stiffener Type 2	
D:	4	0	Num. of Sixteenths in Weld
a:	0.1864	0.0000	= e2 / L2
k:	0	0	
C:	3.5534	3.7100	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
Φ:	0.7500	0.7500	
Stiffener Axial, Pu:	314.1	0.0	kips
Axial Capacity, ΦPn:	447.7	0.0	kips = Φ C C1 D L
Ratio:	70.2%	0.0%	

Pole Analysis per AISC Table J2.5 & Sect. J4.2:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, Pu:	314.1	0.0	kips
Effective Throat, te:	0.1768	0.0000	in = 0.707 w
Shear Stress, fuv:	3.3	0.0	kips/in= Pu / (2 L1)
Section Modulus, S:	768.0	0.0	$in^2 = L1^2 / 3$
Bending Stress, fub:	4.4	0.0	kips/in = Pu e1 / S
Combined Stress, fu:	5.5	0.0	kips/in = $(fuv^2 + fub^2)^{1/2}$
Φ:	1.0000	0.0000	
Stress Capacity, ΦFn	9.5	0.0	kips/in = Φ 0.6 Fy tp
Ratio:	58.3%	0.0%	

Lower Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, Pu:	314.1	0.0	kips
Effective Throat, te:	0.1768	0.0000	in = 0.707 w
Shear Stress, fuv:	3.7	0.0	ksi = Pu / (2 L2)
Section Modulus, S:	588.0	0.0	$in^2 = L2^2 / 3$
Bending Stress, fub:	4.2	0.0	ksi = Pu e2 / S
Combined Stress, fu:	5.6	0.0	kips/in = $(fuv^2 + fub^2)^{1/2}$
Φ:	1.0000	0.0000	
Stress Capacity, ΦFn	9.5	0.0	kips/in = Φ 0.6 Fy tp
Ratio:	59.4%	0.0%	

Stiffener 1 Analysis per AISC Sect. D2, E3 & E7

	Stiffener Type 1	
Gross Area, Ag:	6.0000	in^2
Effective Net Area, Aen:	5.6671	in^2 = Ag U, where U = 0.945
Stiffener Axial, Pu:	314.1	kips
Stiffener Stress, fu:	52.4	ksi = Pu / Ag
b:	11.3300	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	1.8883	in
Q, Where Qa = 1.0:	1.0000	
r:	0.2887	in^3
K L / r:	16.6277	
Φ:	0.9000	
Axial Capacity, ΦFcr:	56.98	ksi = $\Phi [0.658^{Fy/Fe}] Fy$
Φ:	0.9000	
Ten. Yielding Cap., ΦFnt:	58.50	ksi = Φ Fy
Φ:	0.7500	
Ten. Ruplure Cap., ΦFnr:	56.67	ksi = Φ Fu (Aen / Ag)
Ratio:	92.4%	

Stiffener 2 Analysis per AISC Sect. D2, E3 & E7

	Stiffener Type 2	
Gross Area, Ag:	0.0000	in^2
Effective Net Area, Aen:	0.0000	in^2
Stiffener Axial, Pu:	0.0	kips
Stiffener Stress, fu:	0.0	ksi = Pu / Ag
b:	0.0000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	0.0000	in
Q, Where Qa = 1.0:	0.0000	
r:	0.0000	in^3
K L / r:	0.0000	
Φ:	0.0000	
Axial Capacity, ΦFcr:	0.00	ksi = Φ Fy
Φ:	0.0000	
Ten. Yielding Cap., ΦFnt:	0.00	ksi = Φ Fy
Φ:	0.0000	
Ten. Ruplure Cap., ΦFnr:	0.00	ksi = Φ Fu (Aen / Ag)
Ratio:	0.0%	

Analysis Summary:

Bridge Stiffener Type 1
Weld Analysis Ratio: 70.2% PASS
Pole Analysis Ratio: 59.4% PASS
Stiffener Analysis Ratio: 92.4% PASS

Bridge Stiffener Type 2
Weld Analysis Ratio: 0.0% PASS
Pole Analysis Ratio: 0.0% PASS
Stiffener Analysis Ratio: 0.0% PASS

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v2.0, Effective Date: 1-12-12

Date: 12/1/2016
Project No: 37516-3041.002.7700
Site Name: West Hartford United Methodist
Site Number/BUN: 876324
Description:
Owner:
Engineer:

Welded Bridge Stiffener Analysis per TIA-222-G & AISC 13th Ed. (Black)

General Parameters and Loading:

Flange Elevation:	30.00	ft
TIA Reference Standard:	TIA-222-G	
AISC Manual:	13th Ed. (Black)	
Method:	LRFD	
ASD Stress Increase, ASIF:	N/A	
Moment, Muf:	1527.8	k-ft
Axial, Puf:	25.2	kips
Shear, Vf:	22.7	kips

Pole Parameters:

	Upper Pole	Lower Pole	
Pole Diameter, Dp:	30.00	36.00	in
Pole Thickness, tp:	0.3750	0.3750	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	47.00	47.00	in

Bridge Stiffener Parameters:

	Stiffener Type 1	Stiffener Type 2	
Qty. Stiffeners:	3	0	
Upper Weld Length, L1:	60.00	0.00	in
Lower Weld Length, L2:	54.00	0.00	in
Weld Size, w:	0.2500	0.0000	in
Electrode:	E70	E70	
Effective Stiffener Width, Ws:	1.00	0.00	in
Stiffener Thickness, ts:	13.00	0.00	in
Notch, n:	2.35	0.00	in
Stiffener Fy:	65	0	ksi
Stiffener Fu:	80	0	ksi
Unbraced Length, L:	6.00	0.00	in
K:	0.80	0.00	
Stiffener Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Stiffener Circle:	52.70	47.00	in = Df + 2 n + Ws
Upper Eccentricity, e1:	11.35	8.50	in = (Df - Dp) / 2 + n + Ws / 2
Lower Eccentricity, e2:	8.35	5.50	in = (Df - Dp) / 2 + n + Ws / 2

Flange Bolt Parameters:

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	0	0	
Bolt Diameter:	0.00	0.00	in
Bolt Circle:	0.00	0.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Bolt Area, Ag:	0.0000	0.0000	in
Max. Tension:	0.00	0.00	kips
Max. Net Tension:	0.00	0.00	kips
Max. Net Compression:	0.00	0.00	kips
Moment to Bolt Circle:	0.00	0.00	k-ft
Axial to Bolt Circle:	0.00	0.00	kips
Shear to Bolt Circle:	0.00	0.00	kips
Equivalent Bolt Circle:	0.00	0.00	in

Weld Analysis per AISC Tables 8-4 & 8-3:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
D:	4	0	Num. of Sixteenths in Weld
a:	0.1892	0.0000	= e1 / L1
k:	0	0	
C:	3.5447	3.7100	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
Φ:	0.7500	0.7500	
Stiffener Axial, Pu:	472.6	0.0	kips
Axial Capacity, ΦPn:	638.0	0.0	kips = Φ C C1 D L
Ratio:	74.1%	0.0%	

Lower Pole	Stiffener Type 1	Stiffener Type 2	
D:	4	0	Num. of Sixteenths in Weld
a:	0.1546	0.0000	= e2 / L2
k:	0	0	
C:	3.6552	3.7100	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
Φ:	0.7500	0.7500	
Stiffener Axial, Pu:	472.6	0.0	kips
Axial Capacity, ΦPn:	592.1	0.0	kips = Φ C C1 D L
Ratio:	79.8%	0.0%	

Pole Analysis per AISC Table J2.5 & Sect. J4.2:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, Pu:	472.6	0.0	kips
Effective Throat, te:	0.1768	0.0000	in = 0.707 w
Shear Stress, fuv:	3.9	0.0	kips/in= Pu / (2 L1)
Section Modulus, S:	1200.0	0.0	in^2 = $L1^2$ / 3
Bending Stress, fub:	4.5	0.0	kips/in = Pu e1 / S
Combined Stress, fu:	6.0	0.0	kips/in = $(fuv^2 + fub^2)^{1/2}$
Φ:	1.0000	0.0000	
Stress Capacity, ΦFn	9.5	0.0	kips/in = Φ 0.6 Fy tp
Ratio:	63.0%	0.0%	

Lower Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, Pu:	472.6	0.0	kips
Effective Throat, te:	0.1768	0.0000	in = 0.707 w
Shear Stress, fuv:	4.4	0.0	ksi = Pu / (2 L2)
Section Modulus, S:	972.0	0.0	in^2 = $L2^2$ / 3
Bending Stress, fub:	4.1	0.0	ksi = Pu e2 / S
Combined Stress, fu:	6.0	0.0	kips/in = $(fuv^2 + fub^2)^{1/2}$
Φ:	1.0000	0.0000	
Stress Capacity, ΦFn	9.5	0.0	kips/in = Φ 0.6 Fy tp
Ratio:	63.2%	0.0%	

Stiffener 1 Analysis per AISC Sect. D2, E3 & E7

	Stiffener Type 1	
Gross Area, Ag:	13.0000	in^2
Effective Net Area, Aen:	12.3139	in^2 = Ag U, where U = 0.947
Stiffener Axial, Pu:	472.6	kips
Stiffener Stress, fu:	36.4	ksi = Pu / Ag
b:	11.8500	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	0.9115	in
Q, Where Qa = 1.0:	1.0000	
r:	0.2887	in^3
K L / r:	16.6277	
Φ:	0.9000	
Axial Capacity, ΦFcr:	56.98	ksi = Φ $[0.658^{Fy / Fe}]$ Fy
Φ:	0.9000	
Ten. Yielding Cap., ΦFnt:	58.50	ksi = Φ Fy
Φ:	0.7500	
Ten. Rupture Cap., ΦFnr:	56.83	ksi = Φ Fu (Aen / Ag)
Ratio:	64.0%	

Stiffener 2 Analysis per AISC Sect. D2, E3 & E7

	Stiffener Type 2	
Gross Area, Ag:	0.0000	in^2
Effective Net Area, Aen:	0.0000	in^2
Stiffener Axial, Pu:	0.0	kips
Stiffener Stress, fu:	0.0	ksi = Pu / Ag
b:	0.0000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	0.0000	in
Q, Where Qa = 1.0:	0.0000	
r:	0.0000	in^3
K L / r:	0.0000	
Φ:	0.0000	
Axial Capacity, ΦFcr:	0.00	ksi = Φ Fy
Φ:	0.0000	
Ten. Yielding Cap., ΦFnt:	0.00	ksi = Φ Fy
Φ:	0.0000	
Ten. Rupture Cap., ΦFnr:	0.00	ksi = Φ Fu (Aen / Ag)
Ratio:	0.0%	

Analysis Summary:

Bridge Stiffener Type 1
Weld Analysis Ratio: 79.8% PASS
Pole Analysis Ratio: 63.2% PASS
Stiffener Analysis Ratio: 64.0% PASS

Bridge Stiffener Type 2
Weld Analysis Ratio: 0.0% PASS
Pole Analysis Ratio: 0.0% PASS
Stiffener Analysis Ratio: 0.0% PASS

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v4.1 - Effective 7-3-12

Date: 12/1/2016
PJF Project: 37516-3041.002.7700
Client Ref. # 876324
Site Name: West Hartford United Methodist
Description: 130-ft Monopole
Owner: Crown Castle
Engineer: RH

Asymmetric Anchor Rod Analysis

Moment =	2270	k-ft	TIA Ref.	G	Location =	Base Plate		
Axial =	38.0	kips	ASIF =	N/A	η =	0.50	for BP, Rev. G Sect. 4.9.9	
Shear =	26.0	kips	Max Ratio =	105.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	19							

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

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.750	Williams R71	127.7	150	0.0	49.50	0.00	2.66	213.17	207.59	216.99		312.00	69.5%
2	1.750	Williams R71	127.7	150	120.0	49.50	0.00	2.66	213.17	207.59	216.99		312.00	69.5%
3	1.750	Williams R71	127.7	150	240.0	49.50	0.00	2.66	213.17	207.59	216.99		312.00	69.5%
4	1.500	A354 Gr BC	109	125	0.0	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
5	1.500	A354 Gr BC	109	125	22.5	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
6	1.500	A354 Gr BC	109	125	45.0	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
7	1.500	A354 Gr BC	109	125	67.5	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
8	1.500	A354 Gr BC	109	125	90.0	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
9	1.500	A354 Gr BC	109	125	112.5	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
10	1.500	A354 Gr BC	109	125	135.0	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
11	1.500	A354 Gr BC	109	125	157.5	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
12	1.500	A354 Gr BC	109	125	180.0	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
13	1.500	A354 Gr BC	109	125	202.5	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
14	1.500	A354 Gr BC	109	125	225.0	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
15	1.500	A354 Gr BC	109	125	247.5	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
16	1.500	A354 Gr BC	109	125	270.0	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
17	1.500	A354 Gr BC	109	125	292.5	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
18	1.500	A354 Gr BC	109	125	315.0	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
19	1.500	A354 Gr BC	109	125	337.5	41.50	0.00	1.77	118.90	115.19	121.43		141.00	86.1%
								36.26						

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

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

Site Data

BU#: *876324*
Site Name: *West Hartford United*
App #:

Pole Manufacturer:	*Other*

Anchor Rod Data		
Qty:	16	
Diam:	1.5	in
Rod Material:	Other	
Strength (Fu):	125	ksi
Yield (Fy):	109	ksi
Bolt Circle:	41.5	in

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

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	36	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions		
Mu:	1619.1	ft-kips
Axial, Pu:	29.6	kips
Shear, Vu:	20.3	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Results

Max Rod (Cu+ Vu/ń):	121.4 Kips	Rigid
Allowable Axial, Φ*Fu*Anet:	141.0 Kips	AISC LRFD
Anchor Rod Stress Ratio:	86.1% Pass	φ*Tn

Base Plate Results Flexural Check

Base Plate Stress:	28.3 ksi	Rigid
Allowable Plate Stress:	32.4 ksi	AISC LRFD
Base Plate Stress Ratio:	87.4% Pass	φ*Fy
		Y.L. Length: 20.65

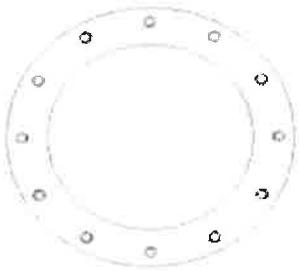
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



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

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

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Job Number: 37516-3041.002.7700
Site Number: 876324
Site Name: West Hartford United Methodist

By: RH
Date: 12/1/2016

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA-222-G

Factored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, Mu =	2270.0		k-ft
Shear, Vu =	26.0		kips
Axial Load, Pu1 =	38.0		kips (from 1.2D + 1.6W)*
Axial Load, Pu2 =	28.5	0.0	kips (from 0.9D + 1.6W)**
OTMu =	2283.0	0.0	k-ft @ Ground

*Axial Load, Pu1 will be used for Soil Compression Analysis.
**Axial Load, Pu2 will be used for Steel Analysis.

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole DP
ACI Code =	ACI 318-05
Seismic Design Category =	D
Reference Standard =	TIA-222-G
Use 1.3 Load Factor?	No
Load Factor =	1.00

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Drilled Pier Parameters

Diameter =	5.5	ft
Height Above Grade =	0.5	ft
Depth Below Grade =	24	ft
fc' =	3.5	ksi
εc =	0.003	in/in
L / D Ratio =	4.45	
Mat Ftdn. Cap Width =		ft
Mat Ftdn. Cap Length =		ft
Depth Below Grade =		ft

Load Combinations Checked per TIA-222-G

1. (0.75) Ult. Skin Friction + (0.75) Ult. End Bearing + (1.2) Effective Soil Wt. - (1.2) Buoyant Conc. Wt. ≥ Comp.
2. (0.75) Ult. Skin Friction + (0.9) Buoyant Conc. Wt. ≥ Uplift

Steel Parameters

Number of Bars =	20	
Rebar Size =	#9	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#5	
Side Clear Cover to Ties =	3	in

Soil Parameters

Water Table Depth =	7.00	ft
Depth to Ignore Soil =	8.25	ft
Depth to Full Cohesion =	0	ft
Full Cohesion Starts at?*	Ground	

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)
Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Direct Embed Pole Shaft Parameters

Dia @ Grade =		in
Dia @ Depth Below Grade =		in
Number of Sides =		
Thickness =		in
Fy =		ksi
Backfill Condition =		

Maximum Capacity Ratios

Maximum Soil Ratio =	100.0%
Maximum Steel Ratio =	100.0%

*Note: The drilled pier foundation was analyzed using the methodology in the software 'PLS-Caisson' (Version 8.10, or newer, by Power Line Systems, Inc.). Per the methods in PLS-Caisson, the soil reactions of cohesive soils are calculated using 8CD independent of the depth of the soil layer. The depth of soil to be ignored at the top of the drilled pier is based the recommendations of the site specific geotechnical report. In the absence of any recommendations, the frost depth at the site or one half of the drilled pier diameter (whichever is greater) shall be ignored.

Define Soil Layers

Note: Cohesion = Undrained Shear Strengh = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	35	125	4000		Clay	8000			35
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	16.42	ft, from Grade
Bending Moment, Mu =	2710.00	k-ft, from COR
Resisting Moment, ΦMn =	8197.78	k-ft, from COR

MOMENT RATIO = 33.1% OK

Shear, Vu =	26.00	kips
Resisting Shear, ΦVn =	78.65	kips

SHEAR RATIO = 33.1% OK

Soil Results: Uplift

Uplift, Tu =	0.00	kips
Uplift Capacity, ΦTn =	55.90	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, Cu =	38.00	kips
Comp. Capacity, ΦCn =	123.31	kips

COMPRESSION RATIO = 30.8% OK

Steel Results (ACI 318-05):

Minimum Steel Area =	11.40	sq in
Actual Steel Area =	20.00	sq in
Axial, ΦPn (min) =	-1080.00	kips, Where ΦMn = 0 k-ft
Axial, ΦPn (max) =	5885.65	kips, Where ΦMn = 0 k-ft

Axial Load, Pu =	55.83	kips @ 8.75 ft Below Grade
Moment, Mu =	2505.05	k-ft @ 8.75 ft Below Grade
Moment, ΦMn =	2568.55	k-ft

MOMENT RATIO = 97.5% OK

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *876324*
Site Name: *West Hartford United Methodist*
App #:

Loads Already Factored		
For M (WL)	1	<----Disregard
For P (DL)	1	<----Disregard

Pier Properties

Concrete:

Pier Diameter =	5.5	ft
Concrete Area =	3421.2	in^2

Reinforcement:

Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	4.80	ft
Vert. Cage Diameter =	57.62	in
Vertical Bar Size =	9	
Bar Diameter =	1.13	in
Bar Area =	1	in^2
Number of Bars =	20	
As Total=	20	in^2
A s/ Aconc, Rho:	0.0058	0.58%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0030
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.58%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	5885.65	kips
at Mu=(ϕ=0.65)Mn=	2805.54	ft-kips
Max Tu, (φ=0.9) Tn =	1080	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	G	
Max. Factored Shaft Mu:	2505.05	ft-kips **(* Note)**
Max. Factored Shaft Pu:	55.83	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	**Shaft Factored Loads**		
1.00	Mu:	2505.05	ft-kips
1.00	Pu:	55.83	kips

Material Properties

Concrete Comp. strength, f'c =	3500	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2005

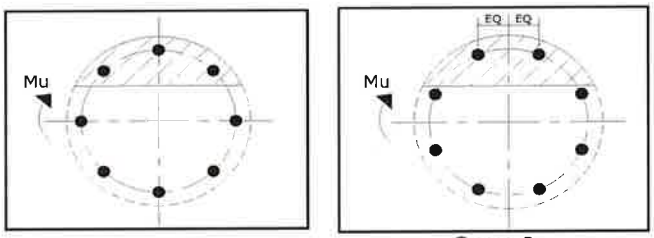
Seismic Properties

Seismic Design Category =	D
Seismic Risk =	**High**

Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **2**



Case 1 Case 2

Dist. From Edge to Neutral Axis:	**10.33**	in
Extreme Steel Strain, εt:	**0.0148**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	55.83	kips
Drilled Shaft Moment Capacity, φMn:	**2568.54**	ft-kips
Drilled Shaft Superimposed Mu:	**2505.05**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**97.5%**

MODIFICATION OF AN EXISTING 130' MONOPOLE
ROHN #347385W
BU #876324; WEST HARTFORD UNITED METHODIST

1358 NEW BRITAIN AVENUE
WEST HARTFORD, CONNECTICUT 06110
HARTFORD COUNTY
LAT: 41° 43' 50.37"; LONG: -72° 45' 13.17"
APP: 356075 REV. 2; WO: 1322500

PJF PAUL J. FORD & COMPANY
250 E Broad St. Ste 500 Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

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

PROJECT CONTACTS

STRUCTURE OWNER:
CROWN CASTLE
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ENGINEER OF RECORD:
PJFMOD@PJFWEB.COM

THIS PROJECT INCLUDES THE FOLLOWING ITEMS
WELDED FLANGE BRIDGE STIFFENERS
SHAFT REINFORCING - FIELD VERIFICATION OF FIT REQUIRED AT MULTIPLE LOCATIONS
REMOVAL OF EXISTING SHAFT REINFORCING
REMOVAL OF BOLTED CHANNEL JUMPS
REMOVAL OF EXISTING ANGLES AND TRIM BRACKET AT BASE

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WIND DESIGN DATA	
REFERENCE STANDARD	ANSI/TIA-222-G-2-2009
LOCAL CODE	2016 CONNECTICUT STATE BUILDING CODE
NOMINAL WIND SPEED (3-SECOND GUST)	97 MPH
ICE THICKNESS	1.0 IN
ICE WIND SPEED	37.6 MPH
SERVICE WIND SPEED	60 MPH
RISK CATEGORY	II
EXPOSURE CATEGORY	C
Kzt	1.0

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

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1296354

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.

MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	
DATE:	12-1-2016

TITLE SHEET

T-1

MODIFICATION INSPECTION NOTES:

1. GENERAL
   - 1.1. THE MODIFICATION INSPECTION (MI) IS A VISUAL INSPECTION OF TOWER MODIFICATIONS AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS, AS DESIGNED BY THE EOR.
   - 1.2. THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, NOR DOES THE MI INSPECTOR TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES.
   - 1.3. ALL MI'S SHALL BE CONDUCTED BY A CROWN CASTLE ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN CASTLE.
   - 1.4. TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PO IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY. IF CONTACT INFORMATION IS NOT KNOWN, CONTACT YOUR CROWN CASTLE POINT OF CONTACT (POC).
   - 1.5. REFER TO ENG-SOW-10007: MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

2. MI INSPECTOR
   - 2.1. THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:
     - 2.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
     - 2.1.2. WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
     - 2.1.3. THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL GC INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MI REPORT TO CROWN CASTLE.

3. GENERAL CONTRACTOR
   - 3.1. THE GC IS REQUIRED TO CONTACT THE MI INSPECTOR AS SOON AS RECEIVING A PO FOR THE MODIFICATION INSTALLATION OR TURNKEY PROJECT TO, AT A MINIMUM:
     - 3.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
     - 3.1.2. WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
     - 3.1.3. BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.
     - 3.1.4. THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND ENG-SOW-10007.

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

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

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

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

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

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

MI CHECKLIST

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

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

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PH: (724) 416-2000

MODIFICATION OF AN EXISTING 130' MONOPOLE

BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	
DATE:	12-1-2016

MI CHECKLIST

T-2

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

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

2. STRUCTURAL STEEL
2.1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:
2.1.1. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
2.1.1.1. "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS."
2.1.1.2. "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS.
2.1.1.3. "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
2.1.2. BY THE AMERICAN WELDING SOCIETY (AWS):
2.1.2.1. "STRUCTURAL WELDING CODE – STEEL D1.1."
2.1.2.2. "STANDARD SYMBOLS FOR WELDING, BRAZING, AND NONDESTRUCTIVE EXAMINATION"
2.2. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS', DEC. 31, 2009.
2.3. ANY MATERIAL OR WORKMANSHIP WHICH IS OBSERVED TO BE DEFECTIVE OR INCONSISTENT WITH THE CONTRACT DOCUMENTS SHALL BE CORRECTED, MODIFIED, OR REPLACED AT THE CONTRACTOR'S EXPENSE.
2.4. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1. ALL WELD ELECTRODES SHALL BE E80XX UNLESS NOTED OTHERWISE ON THE DRAWINGS.
2.5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO CROWN CASTLE'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
2.6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65(FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
2.7. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION I NOTES REGARDING TOUCH UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.
2.8. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
2.9. FIELD CUTTING OF STEEL:
2.9.1. IMPORTANT CUTTING AND WELDING SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES. PER THE 12-01-2005 CROWN CASTLE DIRECTIVE: "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CROWN CASTLE POLICY 'CUTTING AND WELDING SAFETY PLAN (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT". ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
2.9.2. ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. CONTRACTOR TO AVOID 90 DEGREE CORNERS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS.

3. BASE PLATE GROUT - (NOT REQUIRED)

4. FOUNDATION WORK - (NOT REQUIRED)

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

6. EPOXY GROUTED REINFORCING ANCHOR RODS - (NOT REQUIRED)

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

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

9. PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER
9.1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY CROWN CASTLE, CROWN CASTLE WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.
9.2. ANY FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE EXISTING GALVANIZED STEEL POLE STRUCTURE AND THE WELDED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT CROWN CASTLE REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.
9.3. CROWN CASTLE SHALL REFER TO ANSI/TIA-222-G-2-2009, SECTION 14 AND ANNEX J FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY CROWN CASTLE BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. THE EOR RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT, ACCORDING TO ANSI/TIA-222-G-2-2009 SECTION 14.2: "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

10. FIELD NDE MINIMUM REQUIREMENTS - (NOT REQUIRED)

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

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

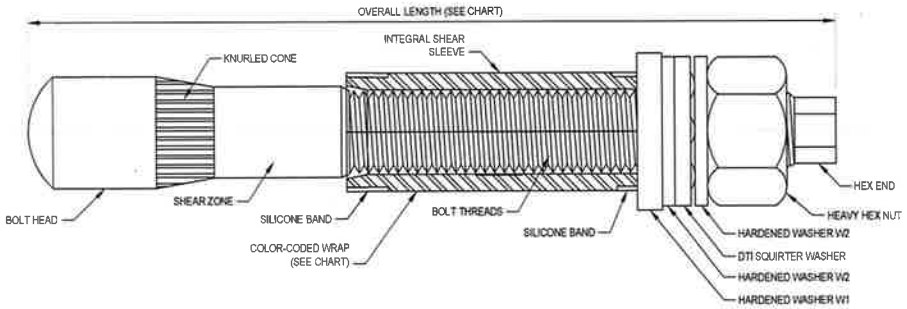
MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37516-3041.002.7700
DRAWN BY:	I M.
DESIGNED BY:	R.W.H.
CHECKED BY:	
DATE:	12-1-2016

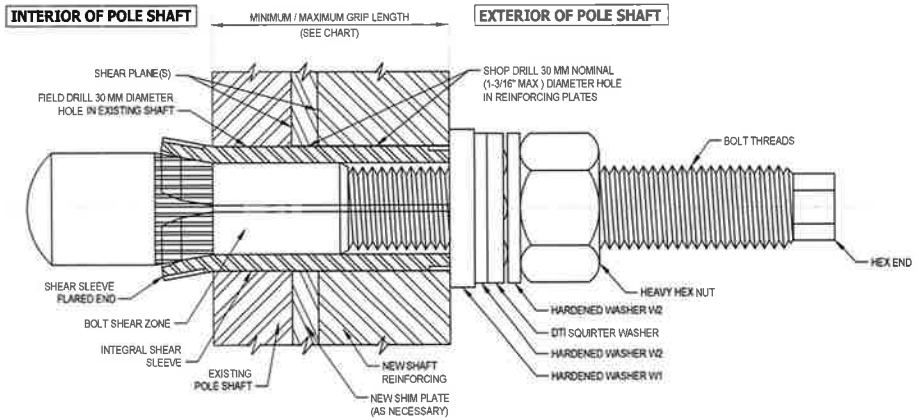
GENERAL NOTES

S-1

FORGBolt™ NOTE SHEET: A325/PC8.8 PORTRAIT VERSION DATE 04/24/2015



PRE-INSTALLED FORGBolt™ ASSEMBLY DETAIL 1 / S-2A



INSTALLED FORGBolt™ ASSEMBLY DETAIL 2 / S-2A

FORGBolt™		AISC Group A Material: ASTM A325 and PC8.8 (Tensile Stress, Fu = 120 ksi minimum)					
GROUP A		FORGBolt™ Size (mm)	Overall Length (inches)	Estimated Weight Each (lbs)	Grip Range (inch)	Comment	Color Code
FORGBolt™ A325 - PC8.8	1	135	5.31	1.3	3/8" to 1"	--	RED
	2	160	6.30	1.6	3/4" to 1-1/2"	--	GREEN
	3	195	7.68	1.9	1-1/4" to 2-1/4"	--	BLUE
	4	260	10.24	2.6	2" to 3-1/2"	Splice Bolt	YELLOW
	5	365	14.37	3.6	3-1/2" to 5-1/2"	Flange Jump Bolt	ORANGE
	6	440	17.32	4.3	5-1/2" to 8-1/2"	Flange Jump Bolt	BLACK
DTI Note		Each Group A (A325/PC8.8) FORGBolt™ assembly shall have a 'Squirter' DTI that is compatible with a M20-PC8.8 bolt.					

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

INSTALLATION NOTES:
1. FIELD DRILL HOLES TO 30 MM DIAMETER.
2. SELECT CORRECT BOLT SIZE FOR INSTALLATION GRIP (REFER TO PLANS).
3. INSERT BOLT ASSEMBLY THROUGH HOLES IN SHAFT REINFORCING PLATES AND SEAT THE HARDENED WASHER W1 FLUSH AGAINST OUTSIDE OF PLATE.
4. HAND TIGHTEN NUT TO FINGER TIGHT.
5. TIGHTEN NUT TO PRETENSIONED CONDITION AND UNTIL DTI SHOWS PROPER INDICATION.
6. PROPERLY DOCUMENT AND INSPECT BOLT TIGHTENING PER PLAN REQUIREMENTS.

BOLT HOLE NOTES:
1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION NOTES:
1. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
2. ALL STRUCTURAL BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.

AISC GROUP A MATERIAL: ASTM A325 AND PC8.8
(Fu = 120 KSI MIN. TENSILE STRESS)

CONTAINS PROPRIETARY INFORMATION PATENT PENDING

DISTRIBUTOR CONTACT:
PRECISION TOWER PRODUCTS
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WEB: www.precisiontowerproducts.com

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MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

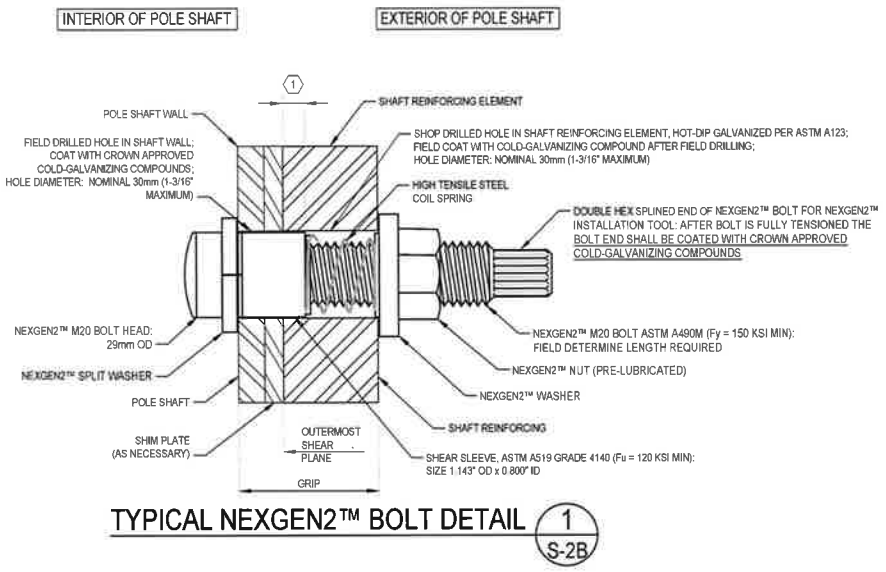
PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	
DATE:	12-1-2016

FORGBolt™ DETAILS

S-2A

NEXGEN2™ BOLT NOTE SHEET: REV. 1.01, 04-15-2015

① NOTE: SHEAR SLEEVE LENGTH: THE SHEAR SLEEVE SHALL PROJECT A MINIMUM OF 3/8" BEYOND THE OUTERMOST SHEAR PLANE. THE CONTRACTOR SHALL SUBMIT FABRICATION DRAWINGS SHOWING NEXGEN2™ BOLT LENGTHS AND SHEAR SLEEVE LENGTHS TO THE EOR FOR REVIEW AND APPROVAL.



TYPICAL NEXGEN2™ BOLT DETAIL ① S-2B

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

BOLT HOLE NOTES:

1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION NOTES:

1. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF SECTION 8.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. PER SECTION 8.2.3: ALL FASTENER ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS IN AISC SECTION 8.1 WITHOUT SEVERING THE SPLINED END AND WITH WASHERS POSITIONED AS REQUIRED IN AISC SECTION 6.2. PER REQUIREMENTS IN SECTION 8.1: PRIOR TO BOLT PRETENSIONING, THE JOINT SHALL FIRST BE COMPACTED TO THE SNUG-TIGHT CONDITION. SNUG TIGHT IS THE CONDITION THAT EXISTS WHEN ALL OF THE PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND THE BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT THE REMOVAL OF THE NUTS WITHOUT THE USE OF A WRENCH. ONCE THE SNUG TIGHT CONDITION IS ACHIEVED, THEN THE BOLT ASSEMBLY CAN BE TIGHTENED TO THE PRETENSIONED CONDITION.
2. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF SECTION 9.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. NOTE THAT COMPLETE INSPECTION OF ALL NEXGEN2™ BOLT ASSEMBLIES IS REQUIRED IN ADDITION TO ROUTINE OBSERVATION.
3. ALL NEXGEN2™ BOLTS SHALL BE INSPECTED BY A QUALIFIED BOLT INSPECTOR PER NOTES 1 AND 2, ABOVE. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE NEXGEN2™ BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THAT THE DOUBLE HEX SPLINED END OF THE BOLTS HAVE BEEN TWISTED OFF AND COATED WITH CROWN APPROVED COLD-GALVANIZING COMPOUND.

PART NUMBER	BOLT LENGTH	SLEEVE LENGTH	MIN GRIP RANGE	MAX GRIP RANGE
M20x36	M20x95	11/16"	15/16"	1 7/16"
M20x48	M20x95	1 3/16"	1 7/16"	1 7/8"
M20x57	M20x95	1 5/8"	1 7/8"	2 1/4"
M20x68	M20x135	2"	2 1/4"	2 11/16"
M20x96	M20x135	2 7/16"	2 11/16"	3 3/4"
M20x127	M20x165	3"	3 3/4"	5"
M20x212	M20x250	4"	5"	8 5/16"

NOTE: NEXGEN2™ BOLT ASSEMBLY SHALL BE MAGNI 565 COATED PER ASTM F2833 AND MANUFACTURER SPECIFICATIONS.

NOTE: INSTALL NEXGEN2™ BOLT ASSEMBLY PER MANUFACTURER'S INSTRUCTIONS.

DISTRIBUTOR CONTACT DETAILS:
ALLFASTENERS
15401 COMMERCE PARK DR.
BROOKPARK, OHIO 44142
PHONE: 440-232-6060
E-MAIL: SALES@ALLFASTENERS.COM

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

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

MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

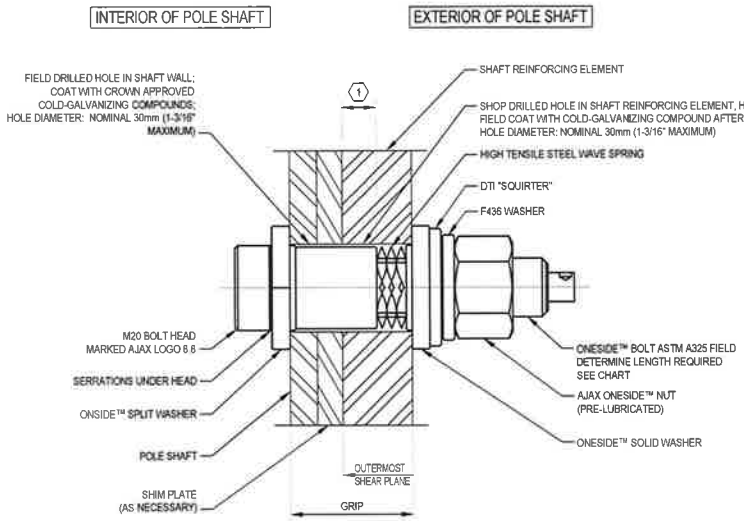
PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	
DATE:	12-1-2016

NEXGEN2™ BOLT DETAIL

S-2B

AJAX ONESIDE™ BOLT NOTE SHEET: REV. 1.01, 06-08-2016

① NOTE: SHEAR SLEEVE LENGTH: THE SHEAR SLEEVE SHALL PROJECT A MINIMUM OF 3/8" BEYOND THE OUTERMOST SHEAR PLANE. THE CONTRACTOR SHALL SUBMIT FABRICATION DRAWINGS SHOWING AJAX ONESIDE™ BOLT LENGTHS AND SHEAR SLEEVE LENGTHS TO THE EOR FOR REVIEW AND APPROVAL.



TYPICAL AJAX ONESIDE™ BOLT DETAIL 1 S-2C

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

BOLT HOLE NOTES:
1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION NOTES:
1. ALL AJAX ONESIDE™ BOLT ASSEMBLIES SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF SECTION 8.2.4 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. PER SECTION 8.2.4: ALL FASTENER ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS IN AISC SECTION 8.1 WITH WASHERS POSITIONED AS REQUIRED IN AISC SECTION 6.2. PER REQUIREMENTS IN SECTION 8.1: PRIOR TO BOLT PRETENSIONING, THE JOINT SHALL FIRST BE COMPACTED TO THE SNUG-TIGHT CONDITION. SNUG TIGHT IS THE CONDITION THAT EXISTS WHEN ALL OF THE PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND THE BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT THE REMOVAL OF THE NUTS WITHOUT THE USE OF A WRENCH. ONCE THE SNUG TIGHT CONDITION IS ACHIEVED, THEN THE BOLT ASSEMBLY CAN BE TIGHTENED TO THE PRETENSIONED CONDITION.
2. ALL AJAX ONESIDE™ BOLT ASSEMBLIES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF SECTION 9.2.4 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. NOTE THAT COMPLETE INSPECTION OF ALL AJAX ONESIDE™ BOLT ASSEMBLIES IS REQUIRED IN ADDITION TO ROUTINE OBSERVATION.
3. ALL AJAX ONESIDE™ BOLTS SHALL BE INSPECTED BY A QUALIFIED BOLT INSPECTOR PER NOTES 1 AND 2, ABOVE. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE AJAX ONESIDE™ BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THAT THE DIRECT TENSION INDICATOR WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED.
4. A MINIMUM OF 4 OUT OF 5 SQUIRTER® DTI PROTRUSIONS SHALL BE ENGAGED IN ANY AJAX ONESIDE™/DTI BOLT ASSEMBLY IN THE REINFORCING MEMBERS. A FEELER GAGE MAY BE USED TO VERIFY PROTRUSION COMPRESSION.
5. INSPECTIONS SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS AND CROWN DOCUMENT ENG-SOW-10007: *MODIFICATION INSPECTION SOW*.

BOLT ASSEMBLY AND INSTALLATION:
1. BOLT MUST BE PURCHASED PRE-ASSEMBLED.
2. FOLLOW BOLT AND DTI MANUFACTURERS INSTRUCTIONS FOR INSTALLATION.

AJAX ONESIDE™ BOLT DETAIL

CODE	SIZE	COLOR	SLEEVE LENGTH	GRIP	GRIP IMP
OSBA20.65-6	M20 x 65	ORANGE	6.0 (0.236")	12.5 / 20.0	0.500" / 0.787"
OSBA20.95-14	M20 x 95	BLACK	14.0 (0.551")	20.0 / 32.0	0.787" / 1.259"
OSBA20.95-22	M20 x 95	GREEN	22.0 (0.866")	30.0 / 50.0	1.181" / 1.968"
OSBA20.95-30	M20 x 95	YELLOW	30.0 (1.181")	40.5 / 50.0	1.595" / 1.968"
OSBA20.135-39	M20 x 135	BLUE	39.0 (1.535")	49.0 / 77.0	1.929" / 3.031"
OSBA20.135-48	M20 x 135	BROWN	48.0 (1.889")	60.5 / 77.0	2.375" / 3.031"
OSBA20.135-57	M20 x 135	PURPLE	57.0 (2.244")	67.0 / 90.0	2.637" / 3.543"
OSBA20.165-76	M20 x 165	RED	76.0 (3.000")	87.0 / 120.0	3.425" / 4.724"
OSBA20.250	M20 x 250	SILVER	MTO	121.0 / 211.0	4.724" / 8.310"

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MANUFATURER
AJAX FASTENERS
SALES + TECH: ONESIDE@AJAXFAST.COM.AU

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MODIFICATION OF AN EXISTING 130' MONOPOLE
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PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
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CHECKED BY:	
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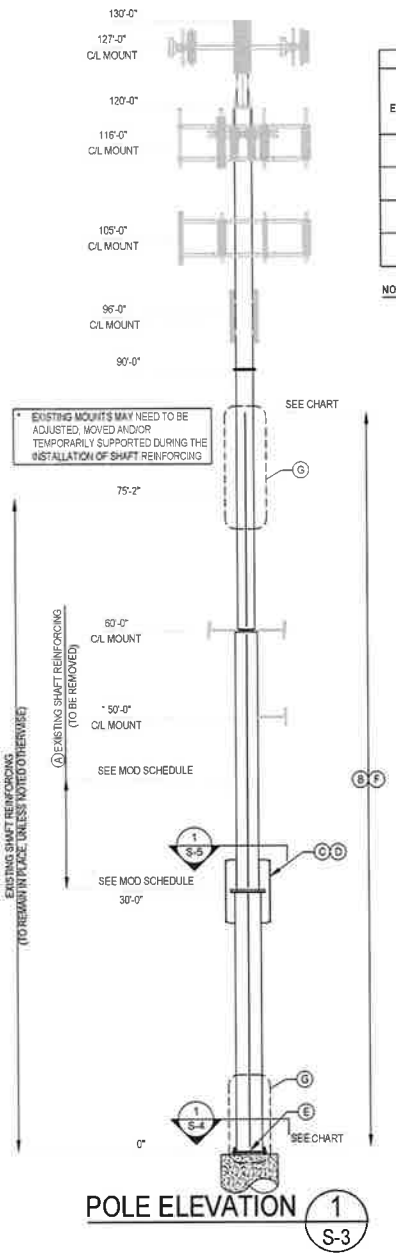
AJAX ONESIDE™ BOLT DETAIL

S-2C



POLE ELEVATION 1 / S-3

NEW CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE

BOTTOM ELEVATION	TOP ELEVATION	FLAT # / DEGREE SEPARATION	ELEMENT	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE BOLTS PER ELEMENT	APPROXIMATE TOTAL BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
0" ± 5"	4'-11"	137 & 211	CCI-SFP-06010045 #1	4'-6"	2	16	32	8	8	16"	184 LBS.
0"-5"	20'-6"	20	CCI-SFP-06512520	20'-0"	1	31	31	11	11	19"	553 LBS.
30'-6"	50'-6"	60, 180 & 240	CCI-SFP-06010020	20'-0"	3	27	81	8	8	16"	1225 LBS.
75'-7"	85'-7"	110, 230 & 350	CCI-SFP-04510010	10'-0"	3	16	48	6	6	20"	459 LBS.
							192				2421 LBS.

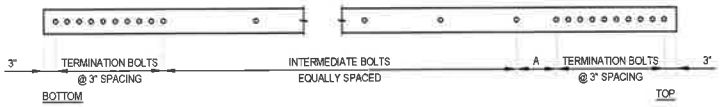
NOTES:

1) ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
2) ALL REINFORCING SHALL BE ASTM A572 GR.65.
3) WELDS SHALL BE E80XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.
4) HOLES FOR BOLTS ARE 30mm UNLESS NOTED OTHERWISE.
5) ALL SHIMS SHALL BE ASTM A-36.
6) ALL HOLES ARE TO BE DRILLED, DO NOT BURN OR PUNCH.
7) FOR PLATES STARTING AT 5", THE BOTTOM OF THE FLAT PLATE SHALL BEGIN AT 6" ± 1". FOR SINGLE PLATES OR MULTIPLE PLATES SPLICED TOGETHER, THE BOTTOM OF THE FLAT PLATE SHALL BEGIN AT THE PROPOSED ELEVATION ± 3". FOR MULTIPLE PLATES SPLICED TOGETHER, THE TOP OF THE FLAT PLATE IS TO BE PLACED SUCH THAT THERE IS NO MORE THAN 3" DIFFERENCE BETWEEN THE ACTUAL OVERALL LENGTH OF THE SPAN AND THE PROPOSED OVERALL LENGTH OF THE SPAN, FROM THE BOTTOM OF THE PLATE TO THE TOP OF THE PLATE.

SPLICE PLATE INSTALLATION CHART

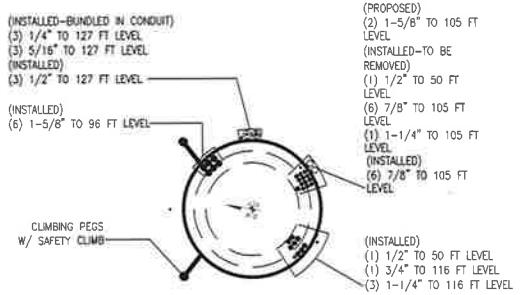
ELEVATION	FLAT PLATE THICKNESS	FLAT PLATE WIDTH	FLAT PLATE LENGTH	FLAT PLATE QUANTITY	WELD LENGTH PER SIDE	TOTAL WELD LENGTH	BOLTS PER SPLICE*	TOTAL STEEL WEIGHT
5'-0"	1"	8"	4'-7"	2	0"	0"	16	187 LBS.
75'-7"	1"	4-1/2"	3'-7"	3	0"	0"	12	165 LBS.
						0"		352 LBS.

* BOLTS INCLUDED IN THE TOTAL QUANTITY LISTED IN THE FLAT PLATE INSTALLATION CHART.



CUSTOM BOLTED BAR DETAIL

NOTE: "A" DIMENSION MAY VARY, NOT TO EXCEED MAXIMUM INTERMEDIATE BOLT SPACING



BASE LEVEL DRAWINGS

SHAFT SECTION DATA

SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER (IN) @ TOP	DIAMETER (IN) @ BOTTOM	POLE GRADE (ksi)	POLE SHAPE
1	10.00	0.1875		16.000	16.000	42	ROUND
2	30.00	0.2500		24.000	24.000	42	ROUND
3	30.00	0.3750		24.000	24.000	42	ROUND
4	30.00	0.3750		30.000	30.000	42	ROUND
5	30.00	0.3750		36.000	36.000	42	ROUND

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

TOWER MODIFICATION SCHEDULE

	ELEVATION	TOWER MODIFICATION DESCRIPTION	REFERENCE SHEETS
(A)	30'-4" TO 43'-0"	REMOVE EXISTING 3 3/8" x 1 1/4" SHAFT REINFORCING	S-3
(B)	SEE CHART	INSTALL NEW SHAFT REINFORCING	S-3
(C)	30'-0"	INSTALL NEW WELDED COVER PLATES	S-5
(D)	30'-0"	REMOVE EXISTING BOLTED CHANNEL FLANGE JUMP	S-5
(E)	30'-0"	REMOVE EXISTING ANGLES AND TRIM BRACKETS	S-4
(F)	SEE CHART	REMOVE AND REPLACE EXISTING STEP BOLTS AS REQUIRED FOR REINFORCING INSTALLATION. INSTALL NEW SAFETY CLIMB. COORDINATE WITH TUF-TUG.	S-3 TO S-5
(G)	0'-5" TO 4'-11", 75'-7" TO 85'-7"	NEW SHAFT REINFORCING AT THESE LOCATIONS TO BE SPLICED TO EXISTING SHAFT REINFORCING. CONTRACTOR SHALL FIELD VERIFY THAT THIS CAN BE ACCOMPLISHED.	S-3, S-4

NOTE : CONTRACTOR SHALL MAINTAIN MINIMUM 3" SPACING BETWEEN NEW AND EXISTING HOLES. SPECIFIED MAXIMUM SPACING SHALL NOT BE EXCEEDED BETWEEN NEW BOLTS. CONTRACTOR SHALL AVOID CREATING ELONGATED HOLES. POSSIBLE SOLUTIONS INCLUDE ADDING BOLTS ABOVE AND BELOW HOLE LOCATIONS THAT ARE MISALIGNED, OR USING THE EXISTING THAT ARE TO BE REMOVED AS TEMPLATES TO FIELD DRILL THE HOLES IN THE NEW BARS.

CROWN CASTLE US PATENT NOS 8,046,972; 8,156,712; 7,849,659; 8,424,269 AND PATENT PENDING

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

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

MODIFICATION OF AN EXISTING 130' MONOPOLE

BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

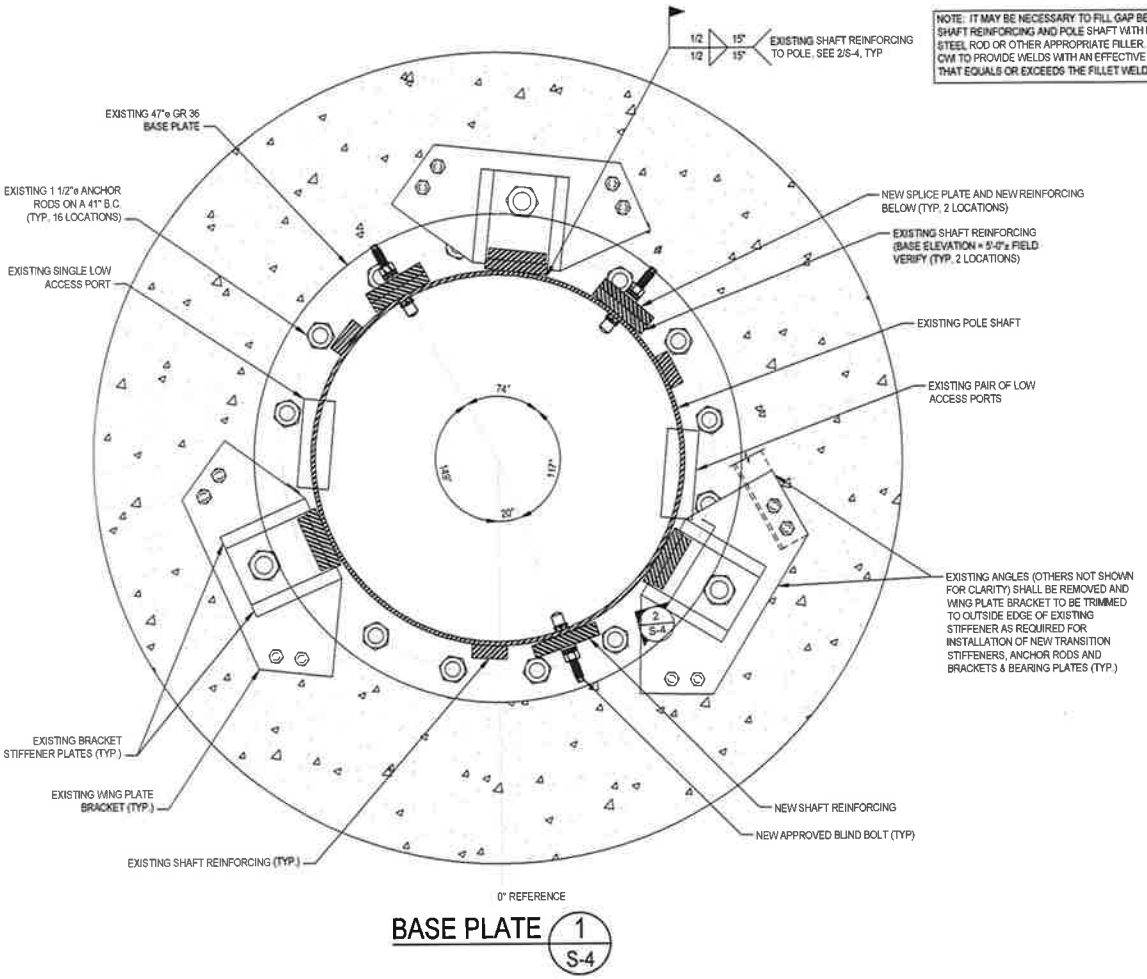
PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	
DATE:	12-1-2016

MONOPOLE PROFILE

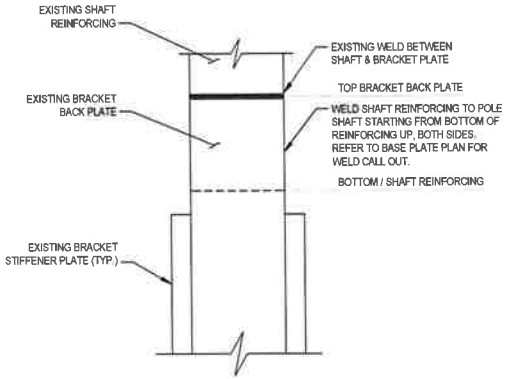
S-3

BASE SPECIFICATIONS	
BASE PLATE:	47"ø, 2" THK., Fy=36 KSI
ANCHOR RODS:	(16) 1 1/2"ø, A354 GRADE BC; 41" B.C.

SEE CHART ON SHEET S-3 FOR NEW SHAFT REINFORCING LOCATIONS (IN DEGREES FROM 0° REFERENCE)



BASE PLATE 1 S-4



PARTIAL ELEVATION 2 S-4
(TYP. (3) LOCATIONS)

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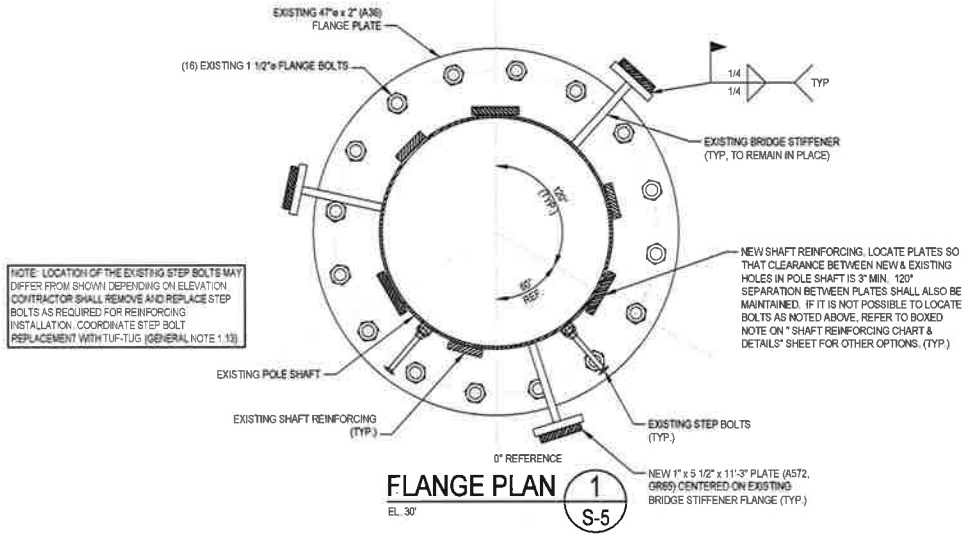
MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	
DATE:	12-1-2016

BASE PLATE DETAILS

S-4

EXISTING C-CHANNEL FLANGE JUMP AND SHAFT REINFORCING SHALL BE REMOVED FOR INSTALLATION OF NEW FLANGE STIFFENERS AND SHAFT REINFORCING



FLANGE PLAN 1 S-5
EL. 30'

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

MODIFICATION OF AN EXISTING 130' MONOPOLE

BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H
CHECKED BY:	
DATE:	12-1-2016

WELDED COVER PLATE DETAILS

S-5

MODIFICATION OF AN EXISTING 130' MONOPOLE
ROHN #347385W
BU #876324; WEST HARTFORD UNITED METHODIST

1358 NEW BRITAIN AVENUE
WEST HARTFORD, CONNECTICUT 06110
HARTFORD COUNTY
LAT: 41° 43' 50.37"; LONG: -72° 45' 13.17"
APP: 356075 REV. 2; WO: 1322500

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

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

PROJECT CONTACTS

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

ENGINEER OF RECORD:
PJFMOD@PJFWEB.COM

THIS PROJECT INCLUDES THE FOLLOWING ITEMS
WELDED FLANGE BRIDGE STIFFENERS
SHAFT REINFORCING - FIELD VERIFICATION OF FIT REQUIRED AT MULTIPLE LOCATIONS
REMOVAL OF EXISTING SHAFT REINFORCING
REMOVAL OF BOLTED CHANNEL JUMPS
REMOVAL OF EXISTING ANGLES AND TRIM BRACKET AT BASE

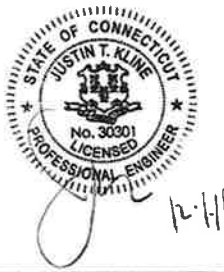
SHEET INDEX	
SHEET NUMBER	DESCRIPTION
T-1	TITLE SHEET
T-2	MI CHECKLIST
S-1	GENERAL NOTES
S-2A	FORGBOLT™ DETAILS
S-2B	NEXGEN2™ BOLT DETAIL
S-2C	AJAX ONESIDE™ BOLT DETAIL
S-3	MONOPOLE PROFILE
S-4	BASE PLATE DETAILS
S-5	WELDED COVER PLATE DETAILS

WIND DESIGN DATA	
REFERENCE STANDARD	ANSI/TIA-222-G-2-2009
LOCAL CODE	2016 CONNECTICUT STATE BUILDING CODE
NOMINAL WIND SPEED (3-SECOND GUST)	97 MPH
ICE THICKNESS	1.0 IN
ICE WIND SPEED	37.6 MPH
SERVICE WIND SPEED	60 MPH
RISK CATEGORY	II
EXPOSURE CATEGORY	C
Kzt	1.0

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

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1296354

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.



12-1-16

MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	RH
DATE:	12-1-2016

TITLE SHEET

T-1

37516-3041.002.DWG

MODIFICATION INSPECTION NOTES:

1. GENERAL
   1.1. THE MODIFICATION INSPECTION (MI) IS A VISUAL INSPECTION OF TOWER MODIFICATIONS AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS, AS DESIGNED BY THE EOR.
   1.2. THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, NOR DOES THE MI INSPECTOR TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES.
   1.3. ALL MI'S SHALL BE CONDUCTED BY A CROWN CASTLE ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN CASTLE.
   1.4. TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PO IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY. IF CONTACT INFORMATION IS NOT KNOWN, CONTACT YOUR CROWN CASTLE POINT OF CONTACT (POC).
   1.5. REFER TO ENG-SOW-10007: MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

2. MI INSPECTOR
   2.1. THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:
      2.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
      2.1.2. WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
      2.1.3. THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL GC INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MI REPORT TO CROWN CASTLE.

3. GENERAL CONTRACTOR
   3.1. THE GC IS REQUIRED TO CONTACT THE MI INSPECTOR AS SOON AS RECEIVING A PO FOR THE MODIFICATION INSTALLATION OR TURNKEY PROJECT TO, AT A MINIMUM:
      3.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
      3.1.2. WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
      3.1.3. BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.
      3.1.4. THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND ENG-SOW-10007.

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

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

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

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

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

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

MI CHECKLIST

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

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

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

12/2/16

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

MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	RH
DATE:	12-1-2016

MI CHECKLIST

T-2

37516-3041.002.DWG

MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV_3, 02/05/2015)

1. **GENERAL NOTES**

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

1.2. THESE DRAWINGS WERE PREPARED FROM INFORMATION PROVIDED BY CROWN CASTLE. THE INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY THE ENGINEER OF RECORD (EOR) FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. PRIOR TO FABRICATION AND INSTALLATION CONTRACTOR SHALL VERIFY ALL LENGTHS AND QUANTITIES GIVEN. LENGTH AND QUANTITIES PROVIDED ARE FOR QUOTING PURPOSES ONLY AND SHALL NOT BE USED FOR FABRICATION. THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT DRAWINGS AND THEIR FIELD VERIFIED CONDITIONS AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO THE EOR AND CROWN CASTLE BEFORE PROCEEDING WITH THE WORK. ANY WORK PERFORMED WITHOUT A PREFABRICATION MAPPING IS DONE AT THE RISK OF THE GENERAL CONTRACTOR AND/OR THE FABRICATOR.

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

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

1.5. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/TIA-1019 (LATEST EDITION), OSHA AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/TIA-1019 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.

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

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

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

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

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

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

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

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

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

2. **STRUCTURAL STEEL**

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

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

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

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

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

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

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

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

2.9. FIELD CUTTING OF STEEL:
2.9.1. IMPORTANT CUTTING AND WELDING SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES. PER THE 12-01-2005 CROWN CASTLE DIRECTIVE "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CROWN CASTLE POLICY 'CUTTING AND WELDING SAFETY PLAN' (DOC # ENG-PLN-100151) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT". ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
2.9.2. ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. CONTRACTOR TO AVOID 90 DEGREE CORNERS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS.

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

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

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

6. **EPOXY GROUTED REINFORCING ANCHOR RODS - (NOT REQUIRED)**

7. TOUCH UP OF GALVANIZING
7.1. THE CONTRACTOR SHALL TOUCH UP ANY AND ALL AREAS OF GALVANIZING ON THE EXISTING STRUCTURE OR NEW COMPONENTS THAT ARE DAMAGED OR ABRADED DURING CONSTRUCTION. GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS ANY AND ALL ABRASIONS, CUTS, FIELD DRILLING, AND ALL FIELD WELDING SHALL BE TOUCHED UP WITH TWO (2) COATS OF ZRC COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3375 FOR PRODUCT INFORMATION.
7.2. CONTRACTOR SHALL CLEAN AND PREPARE ALL FIELD WELDS ON GALVANIZED AND PRIME PAINTED SURFACES FOR TOUCH-UP COATING IN ACCORDANCE WITH AWS D1.1. CROWN CASTLE'S TESTING AGENCY SHALL VERIFY THE PREPARED SURFACE PRIOR TO APPLICATION OF THE TOUCH-UP COATING.
7.3. CROWN CASTLE'S TESTING AGENCY SHALL TEST AND VERIFY THE COATING THICKNESS AFTER THE CONTRACTOR HAS APPLIED THE ZRC COLD GALVANIZING COMPOUND AND IT HAS SUFFICIENTLY DRIED. AREAS FOUND TO BE ADEQUATELY COATED, SHALL BE RE-COATED BY THE CONTRACTOR AND RE-TESTED BY THE TESTING AGENCY.

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

9. **PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER**
9.1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY CROWN CASTLE, CROWN CASTLE WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.
9.2. ANY FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE EXISTING GALVANIZED STEEL POLE STRUCTURE AND THE WELDED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT CROWN CASTLE REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.
9.3. CROWN CASTLE SHALL REFER TO ANSI/TIA-222-G-2-2009, SECTION 14 AND ANNEX J FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY CROWN CASTLE BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. THE EOR RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT. ACCORDING TO ANSI/TIA-222-G-2-2009 SECTION 14.2, IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

10. **FIELD NDE MINIMUM REQUIREMENTS - (NOT REQUIRED)**

STATE OF CONNECTICUT
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12-2-16

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PH: (704) 416-2000

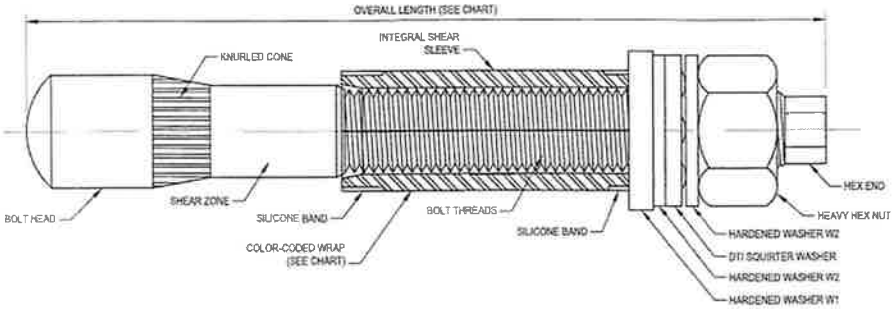
MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37518-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	RH
DATE:	12-1-2016

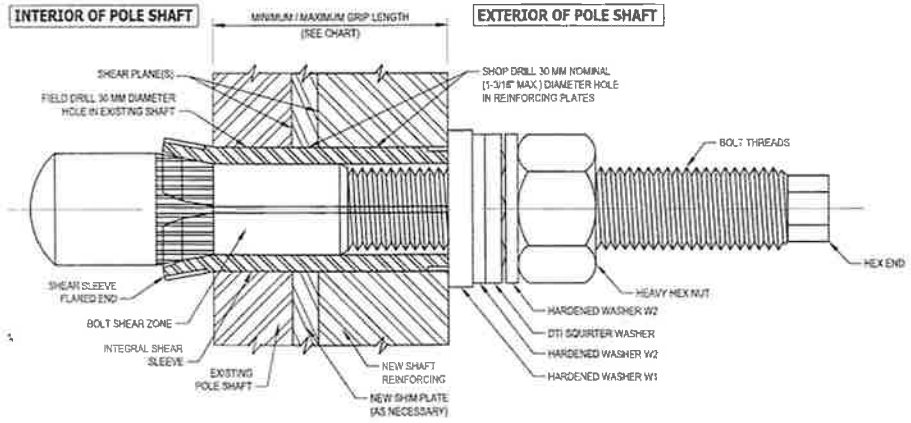
GENERAL NOTES

S-1

37518-3041.002.DWG



PRE-INSTALLED FORGBolt™ ASSEMBLY DETAIL 1 / S-2A



INSTALLED FORGBolt™ ASSEMBLY DETAIL 2 / S-2A

FORGBolt™	AISC Group A Material: ASTM A325 and PC8.8 (Tensile Stress, Fu = 120 ksi minimum)					
GROUP A	FORGBolt™ Size (mm)	Overall Length (inches)	Estimated Weight Each (lbs)	Grip Range (inch)	Comment	Color Code
FORGBolt™ A325 - PC8.8 1	135	5.31	1.3	3/8" to 1"	--	RED
2	160	6.30	1.6	3/4" to 1-1/2"	--	GREEN
3	195	7.68	1.9	1-1/4" to 2-1/4"	--	BLUE
4	260	10.24	2.6	2" to 3-1/2"	Splice Bolt	YELLOW
5	365	14.37	3.6	3-1/2" to 5-1/2"	Flange Jump Bolt	ORANGE
6	440	17.32	4.3	5-1/2" to 8-1/2"	Flange Jump Bolt	BLACK
DTI Note	Each Group A (A325/PC8.8) FORGBolt™ assembly shall have a 'Squirter' DTI that is compatible with a M20-PC8.8 bolt.					

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

INSTALLATION NOTES:
1. FIELD DRILL HOLES TO 30 MM DIAMETER.
2. SELECT CORRECT BOLT SIZE FOR INSTALLATION GRIP (REFER TO PLANS).
3. INSERT BOLT ASSEMBLY THROUGH HOLES IN SHAFT REINFORCING PLATES AND SEAT THE HARDENED WASHER W1 FLUSH AGAINST OUTSIDE OF PLATE.
4. HAND TIGHTEN NUT TO FINGER TIGHT.
5. TIGHTEN NUT TO PRETENSIONED CONDITION AND UNTIL DTI SHOWS PROPER INDICATION.
6. PROPERLY DOCUMENT AND INSPECT BOLT TIGHTENING PER PLAN REQUIREMENTS.

BOLT HOLE NOTES:
1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION NOTES:
1. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
2. ALL STRUCTURAL BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.

AISC GROUP A MATERIAL: ASTM A325 AND PC8.8 (Fu = 120 KSI MIN. TENSILE STRESS)

CONTAINS PROPRIETARY INFORMATION PATENT PENDING

DISTRIBUTOR CONTACT:
PRECISION TOWER PRODUCTS
PHONE: 888-926-4857
EMAIL: info@precisiontowerproducts.com
WEB: www.precisiontowerproducts.com

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

12-7-16

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MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37516-3041.002.7700
DRAWN BY:	LM
DESIGNED BY:	R.W.H.
CHECKED BY:	KH
DATE:	12-1-2016

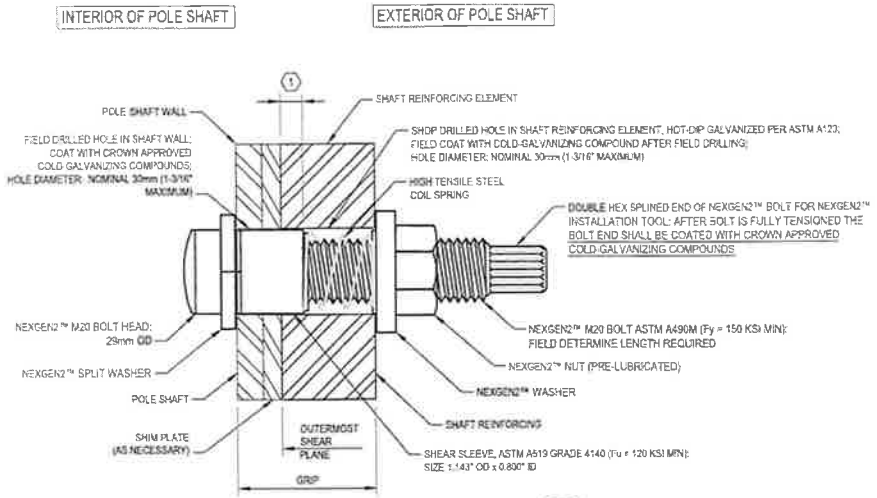
FORGBolt™ DETAILS

S-2A

37516-3041.002.DWG

NEXGEN2™ BOLT NOTE SHEET: REV. 1.01, 04-15-2015

① NOTE: SHEAR SLEEVE LENGTH: THE SHEAR SLEEVE SHALL PROJECT A MINIMUM OF 3/8" BEYOND THE OUTERMOST SHEAR PLANE. THE CONTRACTOR SHALL SUBMIT FABRICATION DRAWINGS SHOWING NEXGEN2™ BOLT LENGTHS AND SHEAR SLEEVE LENGTHS TO THE EOR FOR REVIEW AND APPROVAL.



TYPICAL NEXGEN2™ BOLT DETAIL ① S-2B

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

BOLT HOLE NOTES:

1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION NOTES:

1. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF SECTION 8.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. PER SECTION 8.2.3: ALL FASTENER ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS IN AISC SECTION 8.1 WITHOUT SEVERING THE SPLINED END AND WITH WASHERS POSITIONED AS REQUIRED IN AISC SECTION 6.2. PER REQUIREMENTS IN SECTION 8.1: PRIOR TO BOLT PRETENSIONING, THE JOINT SHALL FIRST BE COMPACTED TO THE SNUG-TIGHT CONDITION. SNUG TIGHT IS THE CONDITION THAT EXISTS WHEN ALL OF THE PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND THE BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT THE REMOVAL OF THE NUTS WITHOUT THE USE OF A WRENCH. ONCE THE SNUG TIGHT CONDITION IS ACHIEVED, THEN THE BOLT ASSEMBLY CAN BE TIGHTENED TO THE PRETENSIONED CONDITION.
2. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF SECTION 9.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. NOTE THAT COMPLETE INSPECTION OF ALL NEXGEN2™ BOLT ASSEMBLIES IS REQUIRED IN ADDITION TO ROUTINE OBSERVATION.
3. ALL NEXGEN2™ BOLTS SHALL BE INSPECTED BY A QUALIFIED BOLT INSPECTOR PER NOTES 1 AND 2, ABOVE. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE NEXGEN2™ BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THAT THE DOUBLE HEX SPLINED END OF THE BOLTS HAVE BEEN TWISTED OFF AND COATED WITH CROWN APPROVED COLD-GALVANIZING COMPOUND..

PART NUMBER	BOLT LENGTH	SLEEVE LENGTH	MIN GRIP RANGE	MAX GRIP RANGE
M20x36	M20x95	11/16"	15/16"	1 7/16"
M20x48	M20x95	1 3/16"	1 7/16"	1 7/8"
M20x57	M20x95	1 5/8"	1 7/8"	2 1/4"
M20x68	M20x135	2"	2 1/4"	2 11/16"
M20x96	M20x135	2 7/16"	2 11/16"	3 3/4"
M20x127	M20x165	3"	3 3/4"	5"
M20x212	M20x250	4"	5"	8 5/16"

NOTE: NEXGEN2™ BOLT ASSEMBLY SHALL BE MAGNI 565 COATED PER ASTM F2833 AND MANUFACTURER SPECIFICATIONS.

NOTE: INSTALL NEXGEN2™ BOLT ASSEMBLY PER MANUFACTURER'S INSTRUCTIONS.

DISTRIBUTOR CONTACT DETAILS:
ALLFASTENERS
15401 COMMERCE PARK DR.
BROOKPARK, OHIO 44142
PHONE: 440-232-6060
E-MAIL: SALES@ALLFASTENERS.COM

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

12-1-16

PJF PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 · Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com
CROWN CASTLE
3530 TORINGDON WAY SUITE 300 CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	RH
DATE:	12-1-2016

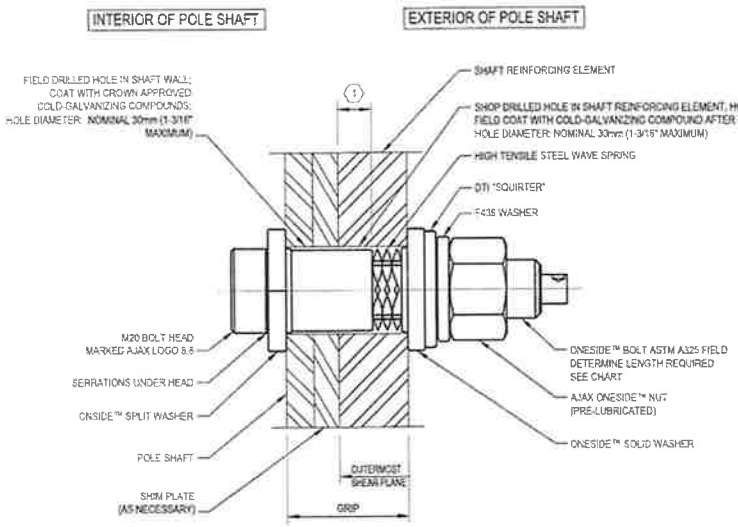
NEXGEN2™ BOLT DETAIL

S-2B

37516-3041.002.(0000)

AJAX ONESIDE™ BOLT NOTE SHEET: REV. 1.01, 06-08-2016

① NOTE: SHEAR SLEEVE LENGTH: THE SHEAR SLEEVE SHALL PROJECT A MINIMUM OF 3/8" BEYOND THE OUTERMOST SHEAR PLANE. THE CONTRACTOR SHALL SUBMIT FABRICATION DRAWINGS SHOWING AJAX ONESIDE™ BOLT LENGTHS AND SHEAR SLEEVE LENGTHS TO THE EOR FOR REVIEW AND APPROVAL.



TYPICAL AJAX ONESIDE™ BOLT DETAIL 1 S-2C

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

BOLT HOLE NOTES:

1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION NOTES:

1. ALL AJAX ONESIDE™ BOLT ASSEMBLIES SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF SECTION 8.2.4 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. PER SECTION 8.2.4: ALL FASTENER ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS IN AISC SECTION 8.1 WITH WASHERS POSITIONED AS REQUIRED IN AISC SECTION 6.2. PER REQUIREMENTS IN SECTION 8.1: PRIOR TO BOLT PRETENSIONING, THE JOINT SHALL FIRST BE COMPACTED TO THE SNUG-TIGHT CONDITION. SNUG TIGHT IS THE CONDITION THAT EXISTS WHEN ALL OF THE PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND THE BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT THE REMOVAL OF THE NUTS WITHOUT THE USE OF A WRENCH. ONCE THE SNUG TIGHT CONDITION IS ACHIEVED, THEN THE BOLT ASSEMBLY CAN BE TIGHTENED TO THE PRETENSIONED CONDITION.
2. ALL AJAX ONESIDE™ BOLT ASSEMBLIES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF SECTION 9.2.4 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. NOTE THAT COMPLETE INSPECTION OF ALL AJAX ONESIDE™ BOLT ASSEMBLIES IS REQUIRED IN ADDITION TO ROUTINE OBSERVATION.
3. ALL AJAX ONESIDE™ BOLTS SHALL BE INSPECTED BY A QUALIFIED BOLT INSPECTOR PER NOTES 1 AND 2, ABOVE. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE AJAX ONESIDE™ BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THAT THE DIRECT TENSION INDICATOR WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED.
4. A MINIMUM OF 4 OUT OF 5 SQUIRTER® DTI PROTRUSIONS SHALL BE ENGAGED IN ANY AJAX ONESIDE™/DTI BOLT ASSEMBLY IN THE REINFORCING MEMBERS. A FEELER GAGE MAY BE USED TO VERIFY PROTRUSION COMPRESSION.
5. INSPECTIONS SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS AND CROWN DOCUMENT ENG-SOW-10007: *MODIFICATION INSPECTION SOW*.

BOLT ASSEMBLY AND INSTALLATION:

1. BOLT MUST BE PURCHASED PRE-ASSEMBLED.
2. FOLLOW BOLT AND DTI MANUFACTURERS INSTRUCTIONS FOR INSTALLATION.

AJAX ONESIDE™ BOLT DETAIL

CODE	SIZE	COLOR	SLEEVE LENGTH	GRIP	GRIP IMP
OSBA20.65-6	M20 x 65	ORANGE	6.0 (0.236")	12.5 / 20.0	0.500" / 0.787"
OSBA20.95-14	M20 x 95	BLACK	14.0 (0.551")	20.0 / 32.0	0.787" / 1.259"
OSBA20.95-22	M20 x 95	GREEN	22.0 (0.866")	30.0 / 50.0	1.181" / 1.968"
OSBA20.95-30	M20 x 95	YELLOW	30.0 (1.181")	40.5 / 50.0	1.595" / 1.968"
OSBA20.135-39	M20 x 135	BLUE	39.0 (1.535")	49.0 / 77.0	1.929" / 3.031"
OSBA20.135-48	M20 x 135	BROWN	48.0 (1.889")	60.5 / 77.0	2.375" / 3.031"
OSBA20.135-57	M20 x 135	PURPLE	57.0 (2.244")	67.0 / 90.0	2.637" / 3.543"
OSBA20.165-76	M20 x 165	RED	76.0 (3.000")	87.0 / 120.0	3.425" / 4.724"
OSBA20.250	M20 x 250	SILVER	MTO	121.0 / 211.0	4.724" / 8.310"

DISTRIBUTOR
IRA SVENSGAARD AND ASSOCIATES
PETER SVENDSGAARD - PETERS@IRASVENS.COM
JOHN KILLAM - JOHN@IRASVENS.COM
PHONE: (530) 647-8225
FAX: (530) 647-8229

MANUFATURER
AJAX FASTENERS
SALES + TECH: ONESIDE@AJAXFAST.COM.AU

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

12-1-16

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

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

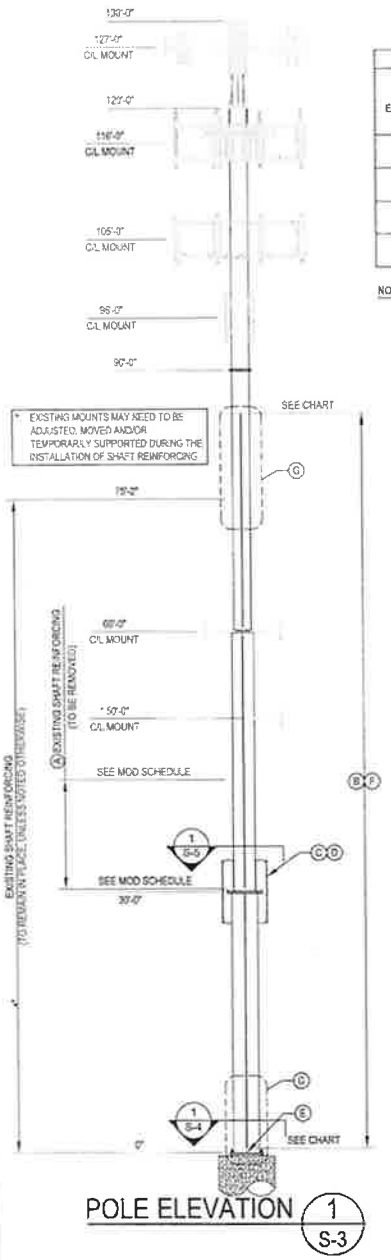
MODIFICATION OF AN EXISTING 130' MONOPOLE
BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	
DATE:	12-1-2016

AJAX ONESIDE™ BOLT DETAIL

S-2C

37516-3041.002.0000



POLE ELEVATION 1 S-3

NEW CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE										
BOTTOM ELEVATION	TOP ELEVATION	FLAT 8 / DEGREE SEPARATION	ELEMENT	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE BOLTS PER ELEMENT	APPROXIMATE TOTAL BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
0' - 5"	4' - 11"	137 & 211	CCI-SFP-06010045#1	4' - 6"	2	16	32	8	8	16"	184 LBS.
0' - 5"	20' - 6"	20	CCI-SFP-06512520	20' - 0"	1	31	31	11	11	13"	553 LBS.
30' - 6"	50' - 6"	60, 180 & 240	CCI-SFP-06010020	20' - 0"	3	27	81	8	8	16"	1225 LBS.
75' - 7"	85' - 7"	110, 230 & 350	CCI-SFP-04510010	10' - 0"	3	16	48	6	6	20"	459 LBS.
							192				3421 LBS.

NOTES:

1.) ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.

2.) ALL REINFORCING SHALL BE ASTM A572 GR. 65.

3.) WELDS SHALL BE E80XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.

4.) HOLES FOR BOLTS ARE 30mm UNLESS NOTED OTHERWISE.

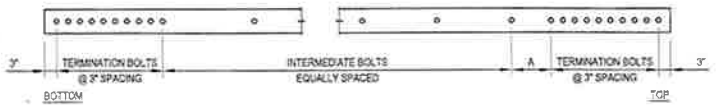
5.) ALL SHIMS SHALL BE ASTM A-36.

6.) ALL HOLES ARE TO BE DRILLED, DO NOT BURN OR PUNCH.

7.) FOR PLATES STARTING AT 5", THE BOTTOM OF THE FLAT PLATE SHALL BEGIN AT 6" ± 1". FOR SINGLE PLATES OR MULTIPLE PLATES SPLICED TOGETHER, THE BOTTOM OF THE FLAT PLATE SHALL BEGIN AT THE PROPOSED ELEVATION ± 3". FOR MULTIPLE PLATES SPLICED TOGETHER, THE TOP OF THE FLAT PLATE IS TO BE PLACED SUCH THAT THERE IS NO MORE THAN 3" DIFFERENCE BETWEEN THE ACTUAL OVERALL LENGTH OF THE SPAN AND THE PROPOSED OVERALL LENGTH OF THE SPAN, FROM THE BOTTOM OF THE PLATE TO THE TOP OF THE PLATE.

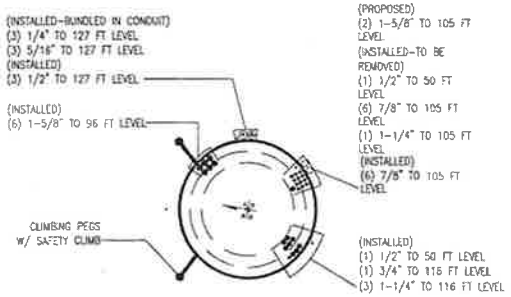
SPLICE PLATE INSTALLATION CHART								
ELEVATION	FLAT PLATE THICKNESS	FLAT PLATE WIDTH	FLAT PLATE LENGTH	FLAT PLATE QUANTITY	WELD LENGTH PER SIDE	TOTAL WELD LENGTH	BOLTS PER SPLICE*	TOTAL STEEL WEIGHT
5' - 0"	1"	6"	4' - 7"	2	0"	0"	16	187 LBS.
75' - 7"	1"	4-1/2"	3' - 7"	3	0"	0"	12	165 LBS.
						0"		352 LBS.

* BOLTS INCLUDED IN THE TOTAL QUANTITY LISTED IN THE FLAT PLATE INSTALLATION CHART.



CUSTOM BOLTED BAR DETAIL

NOTE: "A" DIMENSION MAY VARY, NOT TO EXCEED MAXIMUM INTERMEDIATE BOLT SPACING



BASE LEVEL DRAWINGS

SHAFT SECTION DATA							
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER (IN) @ TOP	DIAMETER (IN) @ BOTTOM	POLE GRADE (ksi)	POLE SHAPE
1	10.00	0.1875		16.000	16.000	42	ROUND
2	30.00	0.2500		24.000	24.000	42	ROUND
3	30.00	0.3750		24.000	24.000	42	ROUND
4	30.00	0.3750		30.000	30.000	42	ROUND
5	30.00	0.3750		36.000	36.000	42	ROUND

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

TOWER MODIFICATION SCHEDULE			
	ELEVATION	TOWER MODIFICATION DESCRIPTION	REFERENCE SHEETS
A	30'-6" TO 43'-0"	REMOVE EXISTING 3 3/8" x 1 1/4" SHAFT REINFORCING	S-3
B	SEE CHART	INSTALL NEW SHAFT REINFORCING	S-3
C	30'-0"	INSTALL NEW WELDED COVER PLATES	S-5
D	30'-0"	REMOVE EXISTING BOLTED CHANNEL FLANGE JUMP	S-5
E	30'-0"	REMOVE EXISTING ANGLES AND TRIM BRACKETS	S-4
F	SEE CHART	REMOVE AND REPLACE EXISTING STEP BOLTS AS REQUIRED FOR REINFORCING INSTALLATION. INSTALL NEW SAFETY CLIMB. COORDINATE WITH TUF-TUG.	S-3 TO S-5
G	0'-5" TO 4'-11", 75'-7" TO 85'-7"	NEW SHAFT REINFORCING AT THESE LOCATIONS TO BE SPLICED TO EXISTING SHAFT REINFORCING. CONTRACTOR SHALL FIELD VERIFY THAT THIS CAN BE ACCOMPLISHED.	S-3, S-4

NOTE : CONTRACTOR SHALL MAINTAIN MINIMUM 3" SPACING BETWEEN NEW AND EXISTING HOLES. SPECIFIED MAXIMUM SPACING SHALL NOT BE EXCEEDED BETWEEN NEW BOLTS. CONTRACTOR SHALL AVOID CREATING ELONGATED HOLES. POSSIBLE SOLUTIONS INCLUDE ADDING BOLTS ABOVE AND BELOW HOLE LOCATIONS THAT ARE MISALIGNED, OR USING THE EXISTING THAT ARE TO BE REMOVED AS TEMPLATES TO FIELD DRILL THE HOLES IN THE NEW BARS.

CROWN CASTLE US PATENT NOS 8,046,972; 8,156,712; 7,849,659; 8,424,269 AND PATENT PENDING

PJF PAUL J. FORD & COMPANY
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3530 TORINGDON WAY SUITE 300 CHARLOTTE, NC 28277
PH: (724) 416-7000

MODIFICATION OF AN EXISTING 130' MONOPOLE

BU #876324; WEST HARTFORD UNITED METHODIST
WEST HARTFORD, CONNECTICUT

PROJECT No:	37518-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	RH
DATE:	12-1-2016

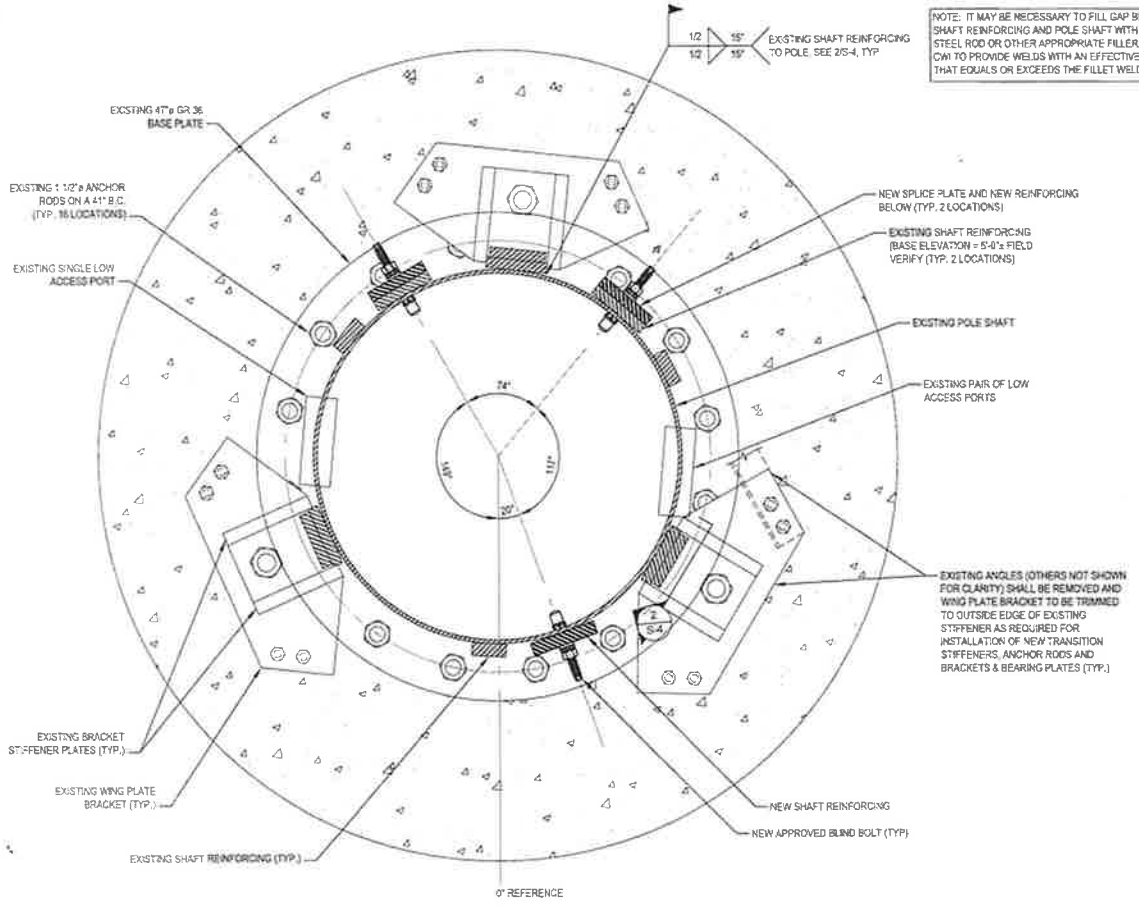
MONOPOLE PROFILE

S-3

37518-3041.002.DWG

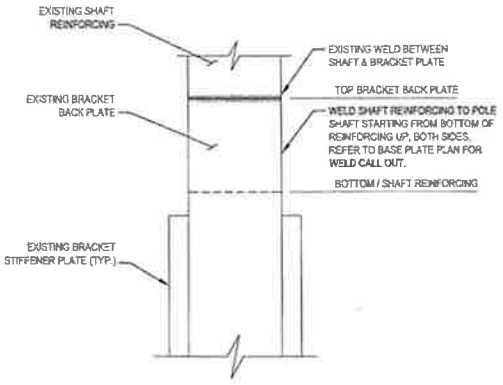
BASE SPECIFICATIONS	
BASE PLATE:	47"ø, 2" THK.; Fy=36 KSI
ANCHOR RODS:	(16) 1 1/2"ø, A354 GRADE BC; 41" B.C.

SEE CHART ON SHEET S-3 FOR NEW SHAFT REINFORCING LOCATIONS (IN DEGREES FROM 0° REFERENCE)



NOTE: IT MAY BE NECESSARY TO FILL GAP BETWEEN SHAFT REINFORCING AND POLE SHAFT WITH ROUND STEEL ROD OR OTHER APPROPRIATE FILLER, WORK WITH CWI TO PROVIDE WELDS WITH AN EFFECTIVE THROAT THAT EQUALS OR EXCEEDS THE FILLET WELD SHOWN.

BASE PLATE 1 / S-4



PARTIAL ELEVATION 2 / S-4
(TYP. (3) LOCATIONS)

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

12-1-18

PJF PAUL J. FORD & COMPANY
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Ph: (724) 416-2000

MODIFICATION OF AN EXISTING 130' MONOPOLE

BU #876324; WEST HARTFORD UNITED METHODIST
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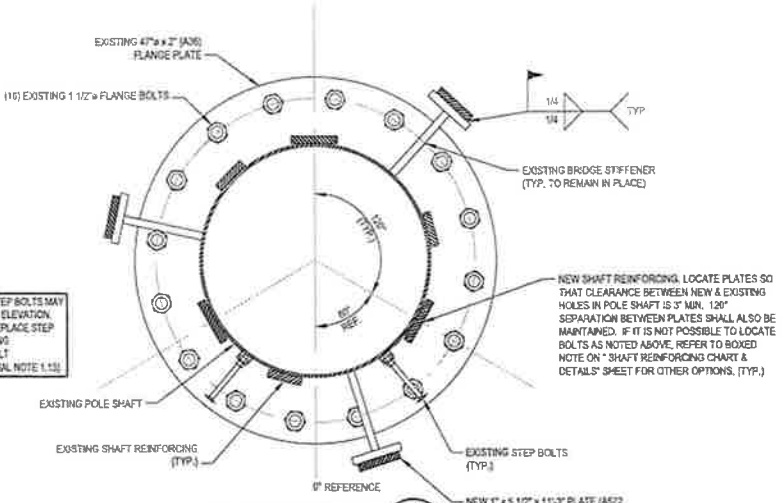
PROJECT No:	37516-3041.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	RH
DATE:	12-1-2018

BASE PLATE DETAILS

S-4

37516-3041.002.DWG

EXISTING C-CHANNEL FLANGE JUMP AND SHAFT REINFORCING SHALL BE REMOVED FOR INSTALLATION OF NEW FLANGE STIFFENERS AND SHAFT REINFORCING



FLANGE PLAN 1 S-5

EL. 30'

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
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12-1-16

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MODIFICATION OF AN EXISTING 130' MONOPOLE

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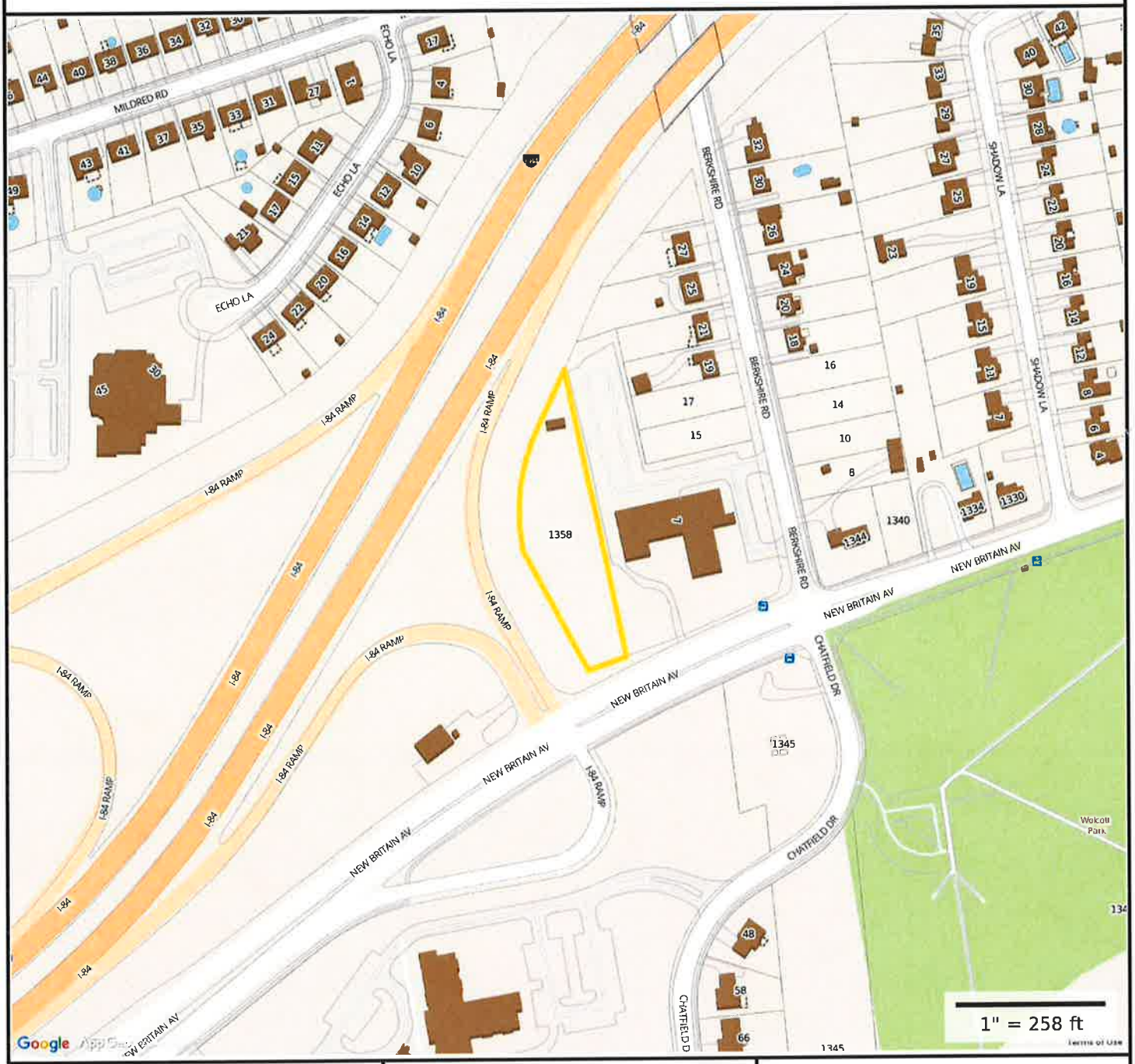
DRAWN BY:	I.M.
DESIGNED BY:	R.W.H.
CHECKED BY:	KH
DATE:	12-1-2016

WELDED COVER PLATE DETAILS

S-5

37516-3041.002.DWG

ATTACHMENT 4



Property Information

Property ID	3771 2 1358 0002
Location	1358 NEW BRITAIN AVENUE
Owner	WEST HARTFORD METHODIST CHURCH

TOWN OF WEST HARTFORD

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

Town of West Hartford, CT makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Parcels updated 5/1/2016
Properties updated Daily

Property Location: 1358 NEW BRITAIN AVENUE | **MAP ID:** E15/ 3771/ 1358/ / | **Bldg Name:** | **State Use:** 201

Vision ID: 18679 | **Account #** 3771 2 1358 0002 | **Bldg #:** 1 of 1 | **Sec #:** 1 of 1 | **Card** 1 of 1 | **Print Date:** 04/20/2016 21:08

CURRENT OWNER

WEST HARTFORD METHODIST CHU

1358 NEW BRITAIN AVENUE
CELL TOWER
WEST HARTFORD, CT 06110
Additional Owners:

TOPO.	UTILITIES	STRT./ROAD	LOCATION
1 Level	2 Yes	5 Not Heavy	2 Typical
1 No	2 Yes		1 No
			1 No

SUPPLEMENTAL DATA

Other ID:	3771213580002	Tax/Exempt	Taxable
Map #	F-30 /	Nbhd	911362.00
Census #	4964	Data Mailer	IEMAIL
PP CANVAS	IE2014		
District	121	Lot Size	0.01
Zoning	R-6		
GIS ID:		ASSOC PID#	

CURRENT ASSESSMENT

Description	Code	Appraised Value	Assessed Value
COM LAND	2-1	150,300	105,210
COM BLDG	2-2	28,000	19,600
COM OUTBL	2-5	10,400	7,280
	Total	188,700	132,090

6155
WEST HARTFORD, CT

VISION

RECORD OF OWNERSHIP

RECORD OF OWNERSHIP	BK-VOL/PAGE	SALE DATE	q/u	v/i	SALE PRICE	V.C.
WEST HARTFORD METHODIST CHURCH	515/ 149	07/16/1973	U	V	0	U
	298/ 256		U	V	0	U

PREVIOUS ASSESSMENTS (HISTORY)

Yr.	Code	Assessed Value	Yr.	Code	Assessed Value	Yr.	Code	Assessed Value
2015	2-1	105,210	2014	2-1	105,210	2013	2-1	105,210
2015	2-2	19,600	2014	2-2	19,600	2013	2-2	19,600
2015	2-5	7,280	2014	2-5	7,280	2013	2-5	7,280
	Total:	132,090		Total:	132,090		Total:	132,090

EXEMPTIONS

Year	Type	Description	Amount
		Total:	

OTHER ASSESSMENTS

Code	Description	Number	Amount	Comm. Int.

This signature acknowledges a visit by a Data Collector or Assessor

APPRAISED VALUE SUMMARY

Appraised Bldg. Value (Card)	28,000
Appraised XF (B) Value (Bldg)	0
Appraised OB (L) Value (Bldg)	10,400
Appraised Land Value (Bldg)	150,300
Special Land Value	0
Total Appraised Parcel Value	188,700
Valuation Method:	C
Adjustment:	0
Net Total Appraised Parcel Value	**188,700**

ASSESSING NEIGHBORHOOD

NBHD/ SUB	NBHD Name	Street Index Name	Tracing	Batch
911/A				

NOTES

10 X 20 EQUIPMENT SHELTER CONSTRUCTED
IN1998;SMALLER MASONRY SHELTER (9X15)
ONSONOTUBES BUILT IN 2001/JOED
7/18/2006
CELL TOWER ON SITE

BUILDING PERMIT RECORD

Permit ID	Issue Date	Type	Description	Amount	Insp. Date	% Comp.	Date Comp.	Comments
0140002994	07/30/2014	BP	Permit	20,000		100	10/01/2014	add 3 antennas, 3 remote
90002683	09/02/2009	BP	Permit	1,000		100	01/01/2011	INSTALL NEW FIRE A
90001473	06/16/2009	BP	Permit	1,200		100	01/01/2011	INSTALL ANSUL R102
90000936	04/16/2009	BP	Permit	40,000		100	01/01/2011	MISCELLANOUS REN
90000917	04/15/2009	BP	Permit	165,000		100	01/01/2011	INSTALL HVAC AT 'U
90000685	04/14/2009	BP	Permit	900,000		0		CONSTRUCT A 17' X 4
90000673	03/10/2009	BP	Permit	7,500		100	01/01/2011	INSTALL 100AMP UNI

VISIT/ CHANGE HISTORY

Date	Type	IS	ID	Cd.	Purpose/Result

LAND LINE VALUATION SECTION

B #	Use Code	Use Description	Zone	D	Front	Depth	Units		Unit Price	I. Factor	S.A.	C. Factor	ST. Idx	Adj.	Notes- Adj	Special Pricing	S Adj Fact	Adj. Unit Price	Land Value
1	201	Commercial	R-6				600	SF	48.00	1.0000	C	0.01		0.00			1.00		300
1	201	Commercial					1.00	BL	15.00	1.0000	C	1.00		0.00	CELL TOWER SITE		1.00		150,000

Total Card Land Units: 0.01 AC | **Parcel Total Land Area:** 0.01 AC | **Total Land Value:** 150,300

Property Location: 1358 NEW BRITAIN AVENUE **MAP ID:** E15/ 3771/ 1358/ / **Bldg Name:** **State Use:** 201

Vision ID: 18679 **Account #** 3771 2 1358 0002 **Bldg #:** 1 of 1 **Sec #:** 1 of 1 **Card** 1 of 1 **Print Date:** 04/20/2016 21:08

CONSTRUCTION DETAIL

Element	Cd.	Ch.	Description
Style	ESHD		Equipment Shed
Model	94		Comm/Ind
Grade	C17		C 1.50
Stories	1		
Occupancy			
Exterior Wall 1	BRK		Brick w/Frame
Exterior Wall 2			
Roof Structure	FLT		Flat
Roof Cover	BLT		Built Up
Interior Wall 1	00		Typical
Interior Wall 2			
Floor Type	RC		Reinf Concrete
Floor Cover	VIN		Vinyl
Heating Fuel	00		Typical
Heating Type	13		Complete HVAC
AC Type	9		Complete HVAC
As Built Use	ESHD		
Bldg Use	201		Commercial
# of Bedrooms			
Total Baths			
Type	00		
Wet Sprinkler			
Dry Sprinkler			
Class	C		Class C
Frame Type	RST		Rigid Steel
Plumbing	01		LIGHT
Ceiling	3		Not Applicable
Group	COM		
Wall Height	10		
Adjustment			

CONSTRUCTION DETAIL (CONTINUED)

Element	Cd.	Ch.	Description

MIXED USE

Code	Description	Percentage
201	Commercial	100

COST/MARKET VALUATION

Adj. Base Rate:	177.00
AYB	1998
Dep Code	A
Remodel Rating	
Year Remodeled	
Dep %	12
Functional Obslnc	
External Obslnc	
Cost Trend Factor	1
Condition	
% Complete	
Overall % Cond	88
Apprais Val	28,000
Dep % Ovr	0
Dep Ovr Comment	
Misc Imp Ovr	0
Misc Imp Ovr Comment	
Cost to Cure Ovr	0
Cost to Cure Ovr Comment	

TEL[200]

COM
10
20

OB-OUTBUILDING & YARD ITEMS(L) / XF-BUILDING EXTRA FEATURES(B)

Code	Description	Sub	Sub Descript	L/B	Units	Unit Price	Yr	Gde	Dp Rt	Cnd	%Cnd	Apr Value
CP18	Chn Link Fenc			L	800	16.39	1998	B		9A	55	9,000
CFC5	Shed - Concret			L	135	10.00	2001	B		A0	80	1,400

BUILDING SUB-AREA SUMMARY SECTION

Code	Description	Living Area	Gross Area	Eff. Area	Unit Cost	Undeprec. Value
COM	COMMERCIAL - NV	0	200			
TEL	TELEPHONE BUILDING	200	200			
	Ttl. Gross Liv/Lease Area:	200	400			

No Photo On Record