NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

June 22, 2015

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification
131 Manor Rd, Guilford CT 06437
Longitude: -72 43 18.51
Latitude: 41 19 48.09
T-Mobile Site#: CTNH110C_VOLTE

Members of the Siting Council:

On behalf of T-Mobile, Northeast Site Solutions (NSS) is submitting an exempt modification application to the Connecticut Siting Council for modification of existing equipment at a tower facility located at 131 Manor Rd, Guilford CT 06437.

The 131 Manor Rd, Guilford, CT facility consists of a 150' Monopole Tower owned and operated by Crown Castle. In order to accommodate technological changes and enhance system performance in the State of Connecticut, T-Mobile plans to modify the equipment configurations at many of its existing cell sites. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the chief elected official of the municipality in which the affected cell site is located.

As part of T-Mobile's VOLTE Project, T-Mobile desires to upgrade their equipment to meet the new standards of 4G technology. The new equipment will allow customers to download files and browse the internet at a high rate of speed while also allowing their phones to be compatible with the latest 4G technology.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in T-Mobile's operations at the site along with the required fee of $625.

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The changes to the facility do not constitute modifications as defined in Connecticut General Statutes significantly changed or altered. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. The overall height of the structure will be unaffected.

2. The proposed changes will not extend the site boundaries. There will be no effect on the site compound other than the new equipment cabinets.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more.

4. The changes in radio frequency power density will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site.

For the foregoing reasons, Northeast Site Solutions (NSS) on behalf of T-Mobile, respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A. Section 16-50j-72(b)(2).

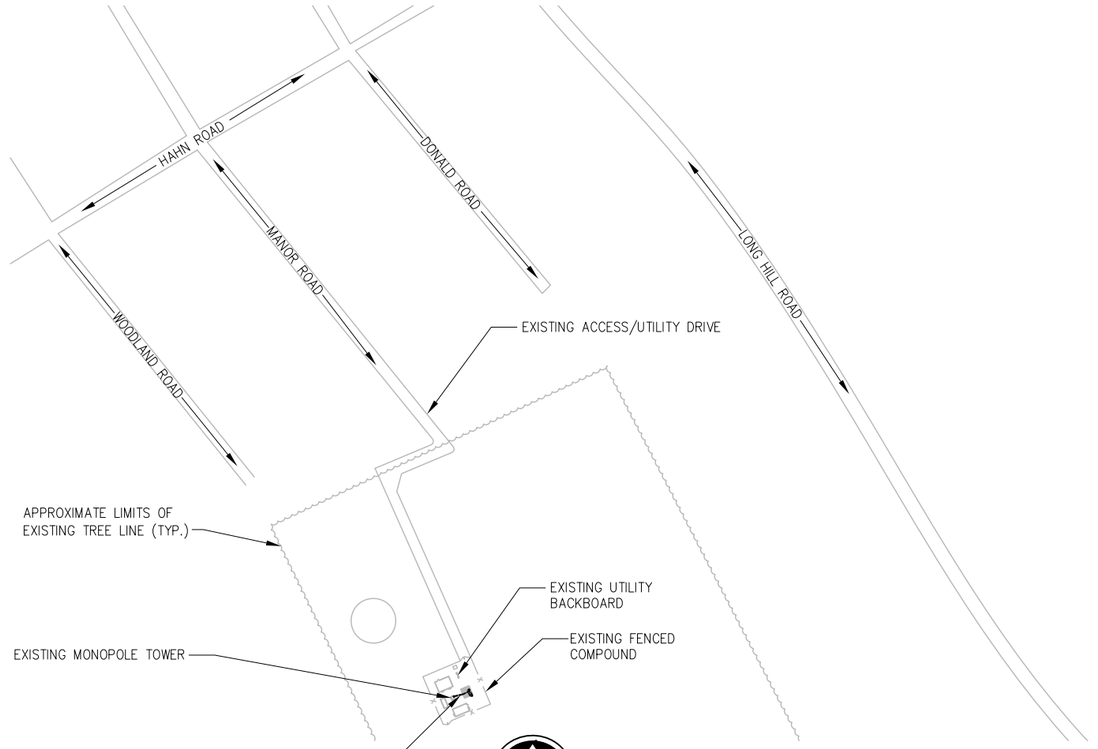
Please feel free to call me at 860.209.4690 with any questions you may have concerning this matter.

Sincerely,

Denise Sabo
Mobile: 860-209-4690
Fax: 413-521-0558
Office: 199 Brickyard Rd, Farmington, CT 06032
Email: denise@northeastsitesolutions.com

cc: Crown Castle
BISHOP B W & SONS INC
Guilford Town Hall, Attn: Attn: George Kral - Town Planner

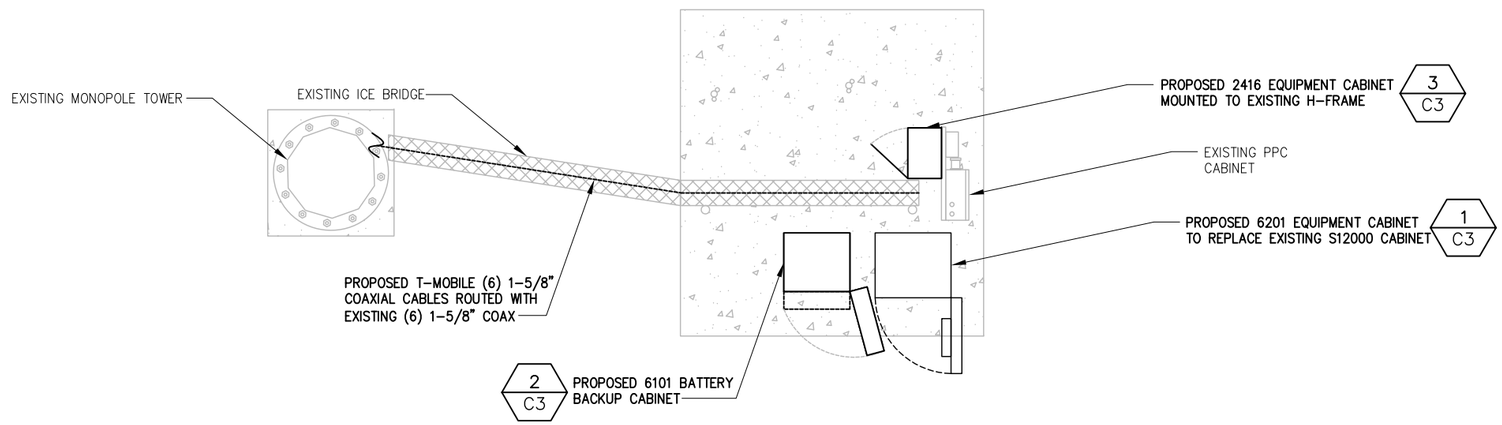
Exhibit A



CALLED NORTH

1 / -- SITE PLAN
SCALE: AS NOTED

GRAPHIC SCALE:
200' 100' 0 100' 200'
SCALE (11x17): 1" = 200'-0"
SCALE (22x34): 1" = 100'-0"



CALLED NORTH

2 / -- COMPOUND PLAN
SCALE: AS NOTED

GRAPHIC SCALE:
6' 3' 0 3' 6'
SCALE (11x17): 1" = 6'-0"
SCALE (22x34): 1" = 3'-0"

BASEMAPPING PREPARED FROM A SITE VISIT PERFORMED BY INFINIGY ON MARCH 3, 2015, AND INFORMATION PROVIDED BY SPRINT, AND DOES NOT REPRESENT AN ACTUAL FIELD SURVEY.

GENERAL SITE NOTES:

1. A COMPLETE BOUNDARY SURVEY OF THE HOST PARCEL HAS NOT BEEN PERFORMED BY INFINIGY ENGINEERING. BOUNDARY INFORMATION WAS OBTAINED FROM INFORMATION PROVIDED BY OTHERS. PROPERTY IS SUBJECT TO ALL EASEMENTS AND RESTRICTIONS OF RECORD.
2. BASEMAPPING INFORMATION BASED ON PROVIDED INFORMATION.
3. CONTRACTOR TO FIELD VERIFY DIMENSIONS AS NECESSARY BEFORE CONSTRUCTION.
4. THE PROPOSED DEVELOPMENT DOES NOT INCLUDE SIGNS OF ADVERTISING.
5. THE PROPOSED DEVELOPMENT IS UNMANNED AND THEREFORE DOES NOT REQUIRE A MEANS OF WATER SUPPLY OR SEWAGE DISPOSAL.
6. NO LANDSCAPING WORK IS PROPOSED IN CONJUNCTION WITH THIS DEVELOPMENT OTHER THAN THAT WHICH IS SHOWN.
7. THE PROPOSED DEVELOPMENT DOES NOT INCLUDE OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES.
8. UTILITIES SHOWN ON PLAN ARE TAKEN FROM OWNERS RECORDS AND FIELD LOCATION OF VISIBLE SURFACE FEATURES. THE EXISTENCE, EXTENT AND EXACT HORIZONTAL AND VERTICAL LOCATIONS OF UTILITIES HAS NOT BEEN VERIFIED. ANY CONTRACTOR PERFORMING WORK ON THIS SITE MUST CONTACT MISS UTILITY AT LEAST 48 HOURS PRIOR TO COMMENCING WORK.
9. ALL OBSOLETE OR UNUSED FACILITIES SHALL BE REMOVED WITHIN 12 MONTHS OF CESSATION OF OPERATIONS.

SITE LEGEND

- SITE PROPERTY LINE
- STREET OR ROAD
- CHAIN LINK FENCE
- OPAQUE WOODEN FENCE
- BOARD ON BOARD FENCE
- DECIDUOUS TREES/SHRUBS
- EVERGREEN TREES/SHRUBS
- TREE LINE
- UTILITY POLE
- (E) EXISTING
- (N) NEW
- (P) PROPOSED
- (F) FUTURE
- PROP. GSM ANTENNA
- PROP. UMTS ANTENNA
- EX. GSM ANTENNA
- EX. UMTS ANTENNA

T-Mobile
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD
SOUTH BLOOMFIELD, CT 06002

NSS NORTHEAST SITE SOLUTIONS
199 BRICKYARD RD
FARMINGTON, CT 06032

INFINIGY
FROM ZERO TO INFINIGY
the solutions are endless
1033 WATERVLIET SHAKER ROAD
ALBANY, NY 12205
OFFICE: (518) 690-0790
FAX: (518) 690-0793

SUBMITTALS

DATE	DESCRIPTION	REVISION
3/31/15	ISSUED FOR REVIEW	A
4/2/15	REVISED PER COMMENTS	B
6/22/15	REVISED PER COMMENTS	C

DEPT.	DATE	APP'D	REVISIONS
RFE			
RF MAN.			
ZONING			
OPS			
CONSTR.			
SITE AC.			

PROJECT NO:	379-000
DRAWN BY:	AHS
CHECKED BY:	AJD

PROFESSIONAL SEAL

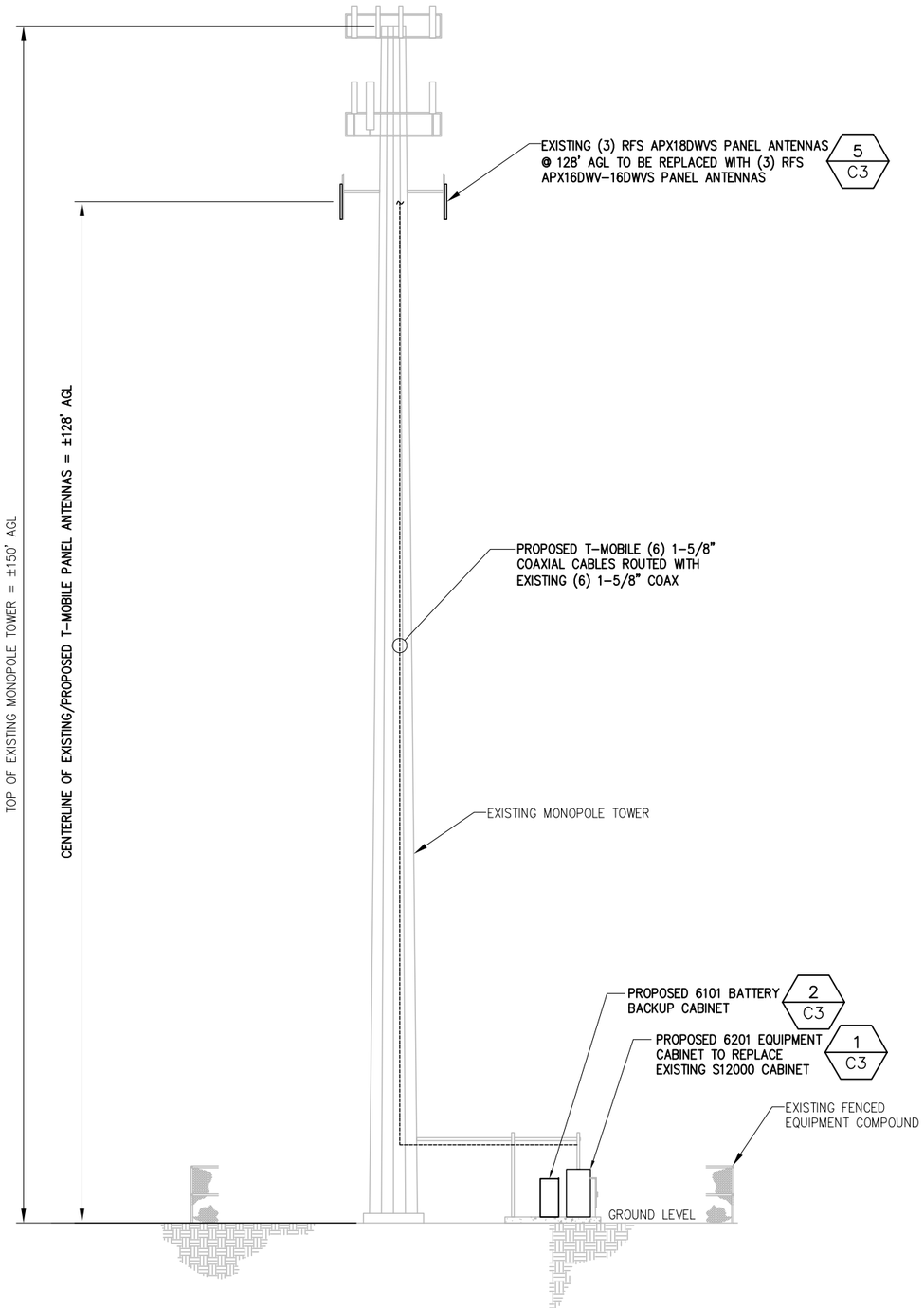
NOTE: IF DRAWINGS ARE 22"x34", USE GRAPHICAL SCALE AND/OR 1/2 TIMES OF THE NOTED SCALE.

SITE NAME
CTNH110C
131 MANOR RD
GUILFORD, CT 06437

SHEET TITLE
SITE PLAN

SHEET NUMBER
C-1
SHEET 3 OF **6** SHEETS

NOTE:
INFINIGY ENGINEERING HAS NOT EVALUATED THE TOWER OR LOADING FOR THIS SITE, AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY REGARDING ITS EXISTING OR PROPOSED LOADING. FINAL INSTALLATION TO COMPLY WITH RESULTS OF PASSING STRUCTURAL ANALYSIS.



1 / -- TOWER ELEVATION
NOT TO SCALE

BASEMAPPING PREPARED FROM A SITE VISIT PERFORMED BY INFINIGY ON MARCH 3, 2015, AND INFORMATION PROVIDED BY SPRINT, AND DOES NOT REPRESENT AN ACTUAL FIELD SURVEY.

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SITE NAME
CTNH110C
131 MANOR RD
GUILFORD, CT 06437

SHEET TITLE
ELEVATION

SHEET NUMBER
C-2
SHEET 4 OF 6 SHEETS

Exhibit B

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **May 28, 2015**

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

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

Subject: **Structural Modification Report**

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CTNH110C
	Carrier Site Name:	Crown/Long Hill
Crown Castle Designation:	**Crown Castle BU Number:**	806361
	Crown Castle Site Name:	NHV 102 943127
	Crown Castle JDE Job Number:	325639
	Crown Castle Work Order Number:	1066814
	Crown Castle Application Number:	286090 Rev. 0
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37515-0830.004.7700
Site Data:	**131 Manor Rd, GUILFORD, New Haven County, CT** **Latitude *41° 19' 48.09"*, Longitude *-72° 43' 18.51"*** **150 Foot - Monopole Tower**	

Dear Timothy Howell,

Paul J Ford and Company is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 790982, in accordance with application 286090, revision 0.

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

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

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the 2005 Connecticut Building Code with 2009 Amendment using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

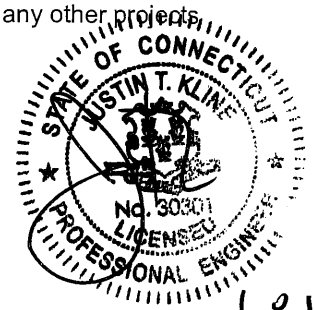
All modifications and equipment proposed in this report shall be installed in accordance with the proposed modifications drawings, referenced in Table 3 of this report, for the determined available structural capacity to be effective.

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:

Kyle Thorpe, E.I.
Structural Designer BKH

tnxTower Report - version 6.1.4.1



6.8.15

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **May 28, 2015**

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

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

Subject: Structural Modification Report

Carrier Designation:	***T-Mobile* Co-Locate**	
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Respectfully submitted by:

Kyle Thorpe, E.I.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 150 ft Monopole tower designed by VALMONT in August of 1986. The tower was originally designed for a wind speed of 20 mph per EIA-222-C. The tower has been modified multiple times in the past to accommodate additional loading.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the 2005 Connecticut Building Code with 2009 Amendment using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
126.0	128.0	6	ericsson	KRY 112 71	6 (E)	1-5/8	1
		3	rfs celwave	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe			

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
147.0	150.0	3	antel	BXA-171085-12BF-2 w/ Mount Pipe	-	-	3
		6	alcatel lucent	RRH2x60-AWS	1 (E)	1-5/8	2
		6	commscope	HBXX-6517DS-A2M w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe	1 (I) 12 (I)	1/2 7/8	1
		6	antel	LPA-80063/6CFx5 w/ Mount Pipe			
	147.0	1	lucent	KS24019-L112A			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 713-1]			
132.0	137.0	6	ericsson	RRUS-11	1 (I) 2 (I) 12 (I)	3/8 3/4 1-1/4	1
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21903			
		1	raycap	DC6-48-60-18-8F			
	132.0	1	tower mounts	Platform Mount [LP 713-1]			
126.0	126.0	1	tower mounts	Side Arm Mount [SO 101-3]	6 (I)	1-5/8	1
	125.0	6	remec	S20057A-1	1 (I)	5/16	3
		3	rfs celwave	APXV18-206516S-C-ACU w/ Mount Pipe			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) 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.

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, 10/02/02	780506	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Valmont, 1983-14, 10/86	217669	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont, 10565-86, 08/13/86	217668	CCISITES
4-POST-MODIFICATION INSPECTION	Vertical Solutions, 06240.01, 09/12/06	2045675	CCISITES
4-POST-MODIFICATION INSPECTION	PJF, 37511-1727, 02/10/12	3099221	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 127277, 10/2/12	3335575*	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 25593, 9/24/2013	4037923	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	PJF, 37601-0022, 3/8/2001	812778**	CCISITES

* This PMI addresses a failed CWI inspection of the base plate stiffeners. See Assumption # 6.
** This Structural Analysis was used to determine the anchor rod and base plate information as it was not provided in the manufactures drawings.

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Anchor rod bolt circle is 50.62 inches.
5) The installed base plate stiffeners were ignored in this analysis.
6) Monopole was reinforced in conformance with the referenced modification drawings.
7) Monopole will be reinforced in conformance with the attached proposed modification drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	150 - 133	Pole	TP19.1871x16x0.1875	1	-2.27	596.34	69.5	Pass
L2	133 - 123.5	Pole	TP20.9682x19.1871x0.422	2	-5.87	1059.49	76.1	Pass
L3	123.5 - 118.75	Pole	TP21.8587x20.9682x0.7535	3	-6.80	1945.69	51.6	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L4	118.75 - 117	Pole	TP22.1868x21.8587x1.0003	4	-7.24	2595.71	42.0	Pass
L5	117 - 95.167	Pole	TP26.28x22.1868x0.6518	5	-10.71	1992.30	81.3	Pass
L6	95.167 - 93.75	Pole	TP26.1715x24.1641x0.7755	6	-12.51	2381.70	76.0	Pass
L7	93.75 - 92.75	Pole	TP26.3591x26.1715x0.9049	7	-13.12	2704.88	69.7	Pass
L8	92.75 - 92	Pole	TP26.4998x26.3591x1.1119	8	-13.38	3313.69	58.5	Pass
L9	92 - 86.5	Pole	TP27.5317x26.4998x0.7925	9	-14.82	2491.96	82.3	Pass
L10	86.5 - 85.75	Pole	TP27.6724x27.5317x1.1823	10	-15.10	3681.12	57.9	Pass
L11	85.75 - 68.0833	Pole	TP30.9868x27.6724x0.7796	11	-20.08	2921.26	87.3	Pass
L12	68.0833 - 66.75	Pole	TP31.237x30.9868x0.8295	12	-20.50	3425.29	75.7	Pass
L13	66.75 - 63.25	Pole	TP31.8936x31.237x1.0345	13	-21.84	4302.11	63.2	Pass
L14	63.25 - 62.75	Pole	TP31.9874x31.8936x1.2477	14	-22.07	4688.77	59.1	Pass
L15	62.75 - 56.25	Pole	TP33.2069x31.9874x0.8881	15	-24.32	3514.99	81.7	Pass
L16	56.25 - 44.667	Pole	TP35.38x33.2069x0.8131	16	-26.41	3714.54	81.1	Pass
L17	44.667 - 35.5	Pole	TP36.4734x32.7534x0.8462	17	-29.84	3840.23	85.1	Pass
L18	35.5 - 34.25	Pole	TP36.7078x36.4734x0.8425	18	-33.61	4119.70	83.8	Pass
L19	34.25 - 33.25	Pole	TP36.8953x36.7078x1.0917	19	-34.08	5333.87	66.1	Pass
L20	33.25 - 26.25	Pole	TP38.2079x36.8953x0.7663	20	-36.57	3918.53	92.4	Pass
L21	26.25 - 25.25	Pole	TP38.3954x38.2079x1.0944	21	-37.06	5574.94	66.5	Pass
L22	25.25 - 12.25	Pole	TP40.833x38.3954x0.8201	22	-42.19	4487.38	87.8	Pass
L23	12.25 - 9.25	Pole	TP41.3955x40.833x0.7657	23	-43.35	4469.04	89.3	Pass
L24	9.25 - 3	Pole	TP42.5675x41.3955x0.7648	24	-45.81	4552.11	90.6	Pass
L25	3 - 0	Pole	TP43.13x42.5675x0.828	25	-47.10	4663.30	90.0	Pass
							Summary	
						Pole (L20)	92.4	Pass
						Rating =	92.4	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC4.7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	94.2	Pass
1	Base Plate	0	87.8	Pass
1	Base Foundation Structural Steel	0	78.9	Pass
1,2	Base Foundation Soil Interaction	0	30.2	Pass

Structure Rating (max from all components) =	**94.2%**

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Foundation Analysis Notes: According to the procedures prescribed and agreed to by the Crown Castle Engineering Foundation Committee, held in January 2010, the existing caisson 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 caisson is the greater of the geotechnical report's recommendation, the frost depth of the site or half of the caisson diameter.

4.1) Recommendations

- Install the modifications per the attached reinforcing drawings.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

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

Options

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

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	150.0000-133.0000	17.0000	0.00	12	16.0000	19.1871	0.1875	0.7500	A572-65 (65 ksi)
L2	133.0000-123.5000	9.5000	0.00	12	19.1871	20.9682	0.4220	1.6879	Reinf 47.45 ksi (47 ksi)
L3	123.5000-118.7500	4.7500	0.00	12	20.9682	21.8587	0.7535	3.0138	Reinf 47.51 ksi (48 ksi)
L4	118.7500-117.0000	1.7500	0.00	12	21.8587	22.1868	1.0003	4.0011	Reinf 47.56 ksi (48 ksi)
L5	117.0000-95.1670	21.8330	4.33	12	22.1868	26.2800	0.6518	2.6070	Reinf 47.83 ksi (48 ksi)
L6	95.1670-93.7500	5.7500	0.00	12	24.1641	26.1715	0.7755	3.1020	Reinf 47.89 ksi (48 ksi)
L7	93.7500-92.7500	1.0000	0.00	12	26.1715	26.3591	0.9049	3.6195	Reinf 45.60 ksi (46 ksi)
L8	92.7500-	0.7500	0.00	12	26.3591	26.4998	1.1119	4.4477	Reinf 45.58 ksi

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
	92.0000								(46 ksi)
L9	92.0000-86.5000	5.5000	0.00	12	26.4998	27.5316	0.7925	3.1702	Reinf 45.66 ksi (46 ksi)
L10	86.5000-85.7500	0.7500	0.00	12	27.5316	27.6724	1.1823	4.7290	Reinf 45.64 ksi (46 ksi)
L11	85.7500-68.0833	17.6667	0.00	12	27.6724	30.9868	0.7795	3.1182	Reinf 48.17 ksi (48 ksi)
L12	68.0833-66.7500	1.3333	0.00	12	30.9868	31.2370	0.8295	3.3180	Reinf 52.73 ksi (53 ksi)
L13	66.7500-63.2500	3.5000	0.00	12	31.2370	31.8936	1.0345	4.1378	Reinf 52.33 ksi (52 ksi)
L14	63.2500-62.7500	0.5000	0.00	12	31.8936	31.9874	1.2477	4.9907	Reinf 47.47 ksi (47 ksi)
L15	62.7500-56.2500	6.5000	0.00	12	31.9874	33.2069	0.8881	3.5526	Reinf 47.55 ksi (48 ksi)
L16	56.2500-44.6670	11.5830	5.33	12	33.2069	35.3800	0.8131	3.2522	Reinf 52.85 ksi (53 ksi)
L17	44.6670-35.5000	14.5000	0.00	12	32.7534	36.4734	0.8461	3.3846	Reinf 52.96 ksi (53 ksi)
L18	35.5000-34.2500	1.2500	0.00	12	36.4734	36.7078	0.8425	3.3700	Reinf 52.94 ksi (53 ksi)
L19	34.2500-33.2500	1.0000	0.00	12	36.7078	36.8953	1.0917	4.3666	Reinf 52.99 ksi (53 ksi)
L20	33.2500-26.2500	7.0000	0.00	12	36.8953	38.2079	0.7663	3.0653	Reinf 53.03 ksi (53 ksi)
L21	26.2500-25.2500	1.0000	0.00	12	38.2079	38.3954	1.0944	4.3774	Reinf 53.03 ksi (53 ksi)
L22	25.2500-12.2500	13.0000	0.00	12	38.3954	40.8330	0.8201	3.2804	Reinf 53.10 ksi (53 ksi)
L23	12.2500-9.2500	3.0000	0.00	12	40.8330	41.3955	0.7657	3.0628	Reinf 55.78 ksi (56 ksi)
L24	9.2500-3.0000	6.2500	0.00	12	41.3955	42.5675	0.7648	3.0590	Reinf 55.29 ksi (55 ksi)
L25	3.0000-0.0000	3.0000		12	42.5675	43.1300	0.8279	3.3118	Reinf 51.70 ksi (52 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	16.5644	9.5468	304.6805	5.6609	8.2880	36.7616	617.3654	4.6986	3.7855	20.189
	19.8640	11.4710	528.5408	6.8019	9.9389	53.1788	1070.9670	5.6457	4.6397	24.745
L2	19.8640	25.4976	1146.0137	6.7179	9.9389	115.3055	2322.1345	12.5492	4.0112	9.506
	21.7079	27.9177	1504.2784	7.3555	10.8615	138.4962	3048.0759	13.7402	4.4886	10.637
L3	21.7079	49.0438	2558.0275	7.2369	10.8615	235.5129	5183.2573	24.1378	3.6002	4.778
	22.6298	51.2043	2911.2058	7.5557	11.3228	257.1099	5898.8922	25.2012	3.8389	5.095
L4	22.6298	67.1823	3730.8167	7.4673	11.3228	329.4958	7559.6461	33.0651	3.1774	3.177
	22.9695	68.2390	3909.6506	7.5848	11.4928	340.1839	7922.0121	33.5852	3.2653	3.264
L5	22.9695	45.1949	2675.2598	7.7095	11.4928	232.7779	5420.8017	22.2435	4.1993	6.443
	27.2071	53.7851	4509.0585	9.1749	13.6130	331.2308	9136.5750	26.4714	5.2963	8.126
L6	26.5826	58.4040	4077.9132	8.3731	12.5170	325.7895	8262.9577	28.7447	4.3976	5.671
	27.0947	63.4165	5220.5714	9.0918	13.5568	385.0882	10578.2930	31.2117	4.9356	6.364
L7	27.0947	73.6188	5998.8559	9.0454	13.5568	442.4972	12155.3083	36.2329	4.5889	5.071
	27.2889	74.1655	6133.4790	9.1126	13.6540	449.2074	12428.0912	36.5020	4.6392	5.127
L8	27.2889	90.3945	7354.4968	9.0385	13.6540	538.6330	14902.2043	44.4894	4.0843	3.673
	27.4346	90.8983	7478.1498	9.0889	13.7269	544.7810	15152.7589	44.7374	4.1220	3.707
L9	27.4346	65.6044	5533.8818	9.2032	13.7269	403.1417	11213.1448	32.2885	4.9779	6.281
	28.5029	68.2376	6227.3583	9.5726	14.2614	436.6584	12618.3163	33.5845	5.2545	6.63

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L10	28.5029	100.3089	8889.2785	9.4331	14.2614	623.3106	18012.0883	49.3690	4.2100	3.561
	28.6485	100.8446	9032.4509	9.4835	14.3343	630.1293	18302.1944	49.6326	4.2477	3.593
L11	28.6485	67.5050	6231.5251	9.6276	14.3343	434.7288	12626.7593	33.2239	5.3270	6.833
	32.0799	75.8248	8831.2191	10.8142	16.0512	550.1913	17894.4442	37.3187	6.2153	7.973
L12	32.0799	80.5509	9350.6474	10.7963	16.0512	582.5521	18946.9467	39.6447	6.0814	7.331
	32.3389	81.2190	9585.2691	10.8859	16.1808	592.3870	19422.3538	39.9735	6.1484	7.412
L13	32.3389	100.6025	11713.3548	10.8125	16.1808	723.9065	23734.4325	49.5135	5.5992	5.413
	33.0187	102.7897	12494.0733	11.0476	16.5209	756.2589	25316.3798	50.5900	5.7752	5.583
L14	33.0187	123.1210	14759.2360	10.9712	16.5209	893.3678	29906.2135	60.5964	5.2037	4.171
	33.1158	123.4978	14895.1748	11.0048	16.5695	898.9523	30181.6625	60.7819	5.2288	4.191
L15	33.1158	88.9381	10979.2900	11.1335	16.5695	662.6211	22247.0181	43.7726	6.1924	6.972
	34.3783	92.4255	12322.1735	11.5701	17.2012	716.3565	24968.0643	45.4890	6.5192	7.34
L16	34.3783	84.8078	11359.1746	11.5970	17.2012	660.3720	23016.7674	41.7398	6.7205	8.266
	36.6281	90.4970	13802.0075	12.3750	18.3268	753.1035	27966.6092	44.5399	7.3029	8.982
L17	35.3253	86.9345	11296.8167	11.4228	16.9662	665.8407	22890.4133	42.7865	6.5102	7.694
	37.7600	97.0701	15726.6450	12.7546	18.8932	832.3962	31866.4465	47.7750	7.5072	8.872
L18	37.7600	96.6613	15663.6189	12.7559	18.8932	829.0603	31738.7385	47.5737	7.5170	8.922
	38.0027	97.2971	15974.7624	12.8398	19.0146	840.1301	32369.1997	47.8867	7.5798	8.997
L19	38.0027	125.1947	20270.5450	12.7506	19.0146	1066.0499	41073.6197	61.6170	6.9121	6.332
	38.1968	125.8538	20592.3915	12.8177	19.1118	1077.4723	41725.7680	61.9414	6.9623	6.378
L20	38.1968	89.1501	14853.1554	12.9342	19.1118	777.1736	30096.5196	43.8769	7.8342	10.223
	39.5557	92.3889	16531.5316	13.4041	19.7917	835.2772	33497.3650	45.4710	8.1860	10.682
L21	39.5557	130.7820	22993.1128	13.2866	19.7917	1161.7570	46590.2803	64.3669	7.3068	6.677
	39.7498	131.4428	23343.3836	13.3538	19.8888	1173.6948	47300.0239	64.6921	7.3571	6.723
L22	39.7498	99.2247	17881.7498	13.4520	19.8888	899.0863	36233.2731	48.8354	8.0921	9.867
	42.2734	105.6617	21592.5408	14.3246	21.1515	1020.8518	43752.3418	52.0035	8.7454	10.664
L23	42.2734	98.7868	20242.5563	14.3441	21.1515	957.0273	41016.9071	48.6199	8.8912	11.612
	42.8558	100.1738	21107.1761	14.5455	21.4429	984.3441	42768.8612	49.3025	9.0420	11.809
L24	42.8558	100.0544	21082.9872	14.5458	21.4429	983.2160	42719.8479	49.2437	9.0444	11.827
	44.0691	102.9403	22960.4449	14.9654	22.0499	1041.2924	46524.0862	50.6641	9.3585	12.237
L25	44.0691	111.2775	24745.0470	14.9427	22.0499	1122.2269	50140.1740	54.7674	9.1892	11.099
	44.6515	112.7772	25759.0697	15.1441	22.3413	1152.9778	52194.8589	55.5055	9.3399	11.281

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 150.0000-133.0000				1	1	1		
L2 133.0000-123.5000				1	1	1		
L3 123.5000-118.7500				1	1	1		
L4 118.7500-117.0000				1	1	1		
L5 117.0000-95.1670				1	1	1		
L6 95.1670-93.7500				1	1	1		
L7 93.7500-92.7500				1	1	1		
L8 92.7500-92.0000				1	1	1		
L9 92.0000-86.5000				1	1	1		
L10 86.5000-85.7500				1	1	1		
L11 85.7500-68.0833				1	1	1		
L12 68.0833-66.7500				1	1	1		
L13 66.7500-63.2500				1	1	1		
L14 63.2500-62.7500				1	1	1		
L15 62.7500-56.2500				1	1	1		
L16 56.2500-44.6670				1	1	1		
L17 44.6670-35.5000				1	1	1		
L18 35.5000-34.2500				1	1	1		
L19 34.2500-33.2500				1	1	1		
L20 33.2500-26.2500				1	1	1		
L21 26.2500-25.2500				1	1	1		
L22 25.2500-12.2500				1	1	1		
L23 12.2500-9.2500				1	1	1		
L24 9.2500-3.0000				1	1	1		
L25 3.0000-0.0000				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
***								
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	147.0000 - 0.0000	1	No Ice	0.1980	1.30
						1/2" Ice	0.2980	2.81
						1" Ice	0.3980	4.94
						2" Ice	0.5980	11.02
						4" Ice	0.9980	30.52
LDF4-50A(1/2")	C	No	Inside Pole	147.0000 - 0.0000	1	No Ice	0.0000	0.15

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15
						2" Ice	0.0000	0.15
						4" Ice	0.0000	0.15
LDF5-50A(7/8")	C	No	Inside Pole	147.0000 - 0.0000	12	No Ice	0.0000	0.33
						1/2" Ice	0.0000	0.33
						1" Ice	0.0000	0.33
						2" Ice	0.0000	0.33
						4" Ice	0.0000	0.33
***								
FB-L98B-002-75000(3/8")	C	No	Inside Pole	132.0000 - 0.0000	1	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
						2" Ice	0.0000	0.06
						4" Ice	0.0000	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	132.0000 - 0.0000	2	No Ice	0.0000	0.59
						1/2" Ice	0.0000	0.59
						1" Ice	0.0000	0.59
						2" Ice	0.0000	0.59
						4" Ice	0.0000	0.59
LCF114-50J(1-1/4")	C	No	Inside Pole	132.0000 - 0.0000	12	No Ice	0.0000	0.70
						1/2" Ice	0.0000	0.70
						1" Ice	0.0000	0.70
						2" Ice	0.0000	0.70
						4" Ice	0.0000	0.70
***								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	126.0000 - 0.0000	1	No Ice	0.1980	0.82
						1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
						2" Ice	0.5980	10.54
						4" Ice	0.9980	30.04
LDF7-50A(1-5/8")	C	No	Inside Pole	126.0000 - 0.0000	5	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
LCF158-50J-P7(1 5/8")	C	No	Inside Pole	126.0000 - 0.0000	6	No Ice	0.0000	0.85
						1/2" Ice	0.0000	0.85
						1" Ice	0.0000	0.85
						2" Ice	0.0000	0.85
						4" Ice	0.0000	0.85
***								
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	125.0000 - 0.0000	1	No Ice	0.2083	0.00
						1/2" Ice	0.3194	0.00
						1" Ice	0.4306	0.00
						2" Ice	0.6528	0.00
						4" Ice	1.0972	0.00
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	37.2500 - 22.2500	1	No Ice	0.2083	0.00
						1/2" Ice	0.3194	0.00
						1" Ice	0.4306	0.00
						2" Ice	0.6528	0.00
						4" Ice	1.0972	0.00
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	22.2500 - 0.0000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00
						2" Ice	0.6111	0.00
						4" Ice	1.0556	0.00
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	135.0000 - 37.2500	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00
						2" Ice	0.6111	0.00
						4" Ice	1.0556	0.00

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.9758 9.6473 10.2909 11.5946 14.3212	6.9629 8.1817 9.1436 11.0219 15.0267	0.07 0.14 0.21 0.40 0.91
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.9758 9.6473 10.2909 11.5946 14.3212	6.9629 8.1817 9.1436 11.0219 15.0267	0.07 0.14 0.21 0.40 0.91
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.9758 9.6473 10.2909 11.5946 14.3212	6.9629 8.1817 9.1436 11.0219 15.0267	0.07 0.14 0.21 0.40 0.91
(2) RRH2x60-AWS	A	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.1904 2.3976 2.6134 3.0710 4.0899	1.4290 1.6109 1.8015 2.2085 3.1263	0.04 0.06 0.08 0.13 0.26
(2) RRH2x60-AWS	B	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.1904 2.3976 2.6134 3.0710 4.0899	1.4290 1.6109 1.8015 2.2085 3.1263	0.04 0.06 0.08 0.13 0.26
(2) RRH2x60-AWS	C	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.1904 2.3976 2.6134 3.0710 4.0899	1.4290 1.6109 1.8015 2.2085 3.1263	0.04 0.06 0.08 0.13 0.26
DB-T1-6Z-8AB-0Z	C	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.6000 5.9154 6.2395 6.9136 8.3654	2.3333 2.5580 2.7914 3.2840 4.3728	0.04 0.08 0.12 0.21 0.45
BXA-70063-6CF-2 w/ Mount Pipe	A	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.9686 8.6091 9.2158 10.4591 13.0655	5.8008 6.9529 7.8191 9.6015 13.3662	0.04 0.10 0.17 0.34 0.80
BXA-70063-6CF-2 w/ Mount Pipe	B	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.9686 8.6091 9.2158 10.4591 13.0655	5.8008 6.9529 7.8191 9.6015 13.3662	0.04 0.10 0.17 0.34 0.80
BXA-70063-6CF-2 w/ Mount Pipe	C	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.9686 8.6091 9.2158 10.4591 13.0655	5.8008 6.9529 7.8191 9.6015 13.3662	0.04 0.10 0.17 0.34 0.80
(2) LPA-80063/6CFx5 w/ Mount Pipe	A	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice	10.5451 11.2089 11.8391 13.1295 15.8301	10.6455 11.9061 12.8841 14.8937 19.1279	0.05 0.14 0.25 0.48 1.09

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
						4" Ice			
(2) LPA-80063/6CFx5 w/ Mount Pipe	B	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.5451 11.2089 11.8391 13.1295 15.8301	10.6455 11.9061 12.8841 14.8937 19.1279	0.05 0.14 0.25 0.48 1.09
(2) LPA-80063/6CFx5 w/ Mount Pipe	C	From Leg	4.0000 0.00 3.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.5451 11.2089 11.8391 13.1295 15.8301	10.6455 11.9061 12.8841 14.8937 19.1279	0.05 0.14 0.25 0.48 1.09
(2) FD9R6004/2C-3L	A	From Leg	4.0000 0.00 0.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	B	From Leg	4.0000 0.00 0.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	C	From Leg	4.0000 0.00 0.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
KS24019-L112A	A	From Leg	4.0000 0.00 0.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1556 0.2247 0.3025 0.4840 0.9506	0.1556 0.2247 0.3025 0.4840 0.9506	0.01 0.01 0.01 0.02 0.06
Platform Mount [LP 713-1]	C	None		0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	31.2700 39.6800 48.0900 64.9100 98.5500	31.2700 39.6800 48.0900 64.9100 98.5500	1.51 1.93 2.35 3.19 4.86
***									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.2208 6.7144 7.2182 8.2568 10.4762	4.8204 5.5082 6.2127 7.6716 11.0613	0.09 0.14 0.21 0.36 0.76
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.2208 6.7144 7.2182 8.2568 10.4762	4.8204 5.5082 6.2127 7.6716 11.0613	0.09 0.14 0.21 0.36 0.76
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.2208 6.7144 7.2182 8.2568 10.4762	4.8204 5.5082 6.2127 7.6716 11.0613	0.09 0.14 0.21 0.36 0.76
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice 1/2" Ice	8.4975 9.1490 9.7672	6.3042 7.4790 8.3676	0.07 0.14 0.21

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	11.0311	10.1785	0.38
						2" Ice	13.6786	14.0237	0.87
						4" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice	8.4975	6.3042	0.07
						1/2" Ice	9.1490	7.4790	0.14
						1" Ice	9.7672	8.3676	0.21
						2" Ice	11.0311	10.1785	0.38
						4" Ice	13.6786	14.0237	0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice	8.4975	6.3042	0.07
						1/2" Ice	9.1490	7.4790	0.14
						1" Ice	9.7672	8.3676	0.21
						2" Ice	11.0311	10.1785	0.38
						4" Ice	13.6786	14.0237	0.87
(2) LGP21401	A	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice	1.2880	0.3640	0.01
						1/2" Ice	1.4453	0.4785	0.02
						1" Ice	1.6112	0.6017	0.03
						2" Ice	1.9690	0.8739	0.05
						4" Ice	2.7882	1.5220	0.14
(2) LGP21401	B	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice	1.2880	0.3640	0.01
						1/2" Ice	1.4453	0.4785	0.02
						1" Ice	1.6112	0.6017	0.03
						2" Ice	1.9690	0.8739	0.05
						4" Ice	2.7882	1.5220	0.14
(2) LGP21401	C	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice	1.2880	0.3640	0.01
						1/2" Ice	1.4453	0.4785	0.02
						1" Ice	1.6112	0.6017	0.03
						2" Ice	1.9690	0.8739	0.05
						4" Ice	2.7882	1.5220	0.14
(2) RRUS-11	A	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice	3.2486	1.3726	0.05
						1/2" Ice	3.4905	1.5510	0.07
						1" Ice	3.7411	1.7380	0.09
						2" Ice	4.2682	2.1381	0.15
						4" Ice	5.4260	3.0418	0.31
(2) RRUS-11	B	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice	3.2486	1.3726	0.05
						1/2" Ice	3.4905	1.5510	0.07
						1" Ice	3.7411	1.7380	0.09
						2" Ice	4.2682	2.1381	0.15
						4" Ice	5.4260	3.0418	0.31
(2) RRUS-11	C	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice	3.2486	1.3726	0.05
						1/2" Ice	3.4905	1.5510	0.07
						1" Ice	3.7411	1.7380	0.09
						2" Ice	4.2682	2.1381	0.15
						4" Ice	5.4260	3.0418	0.31
DC6-48-60-18-8F	A	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice	1.4667	1.4667	0.02
						1/2" Ice	1.6667	1.6667	0.04
						1" Ice	1.8778	1.8778	0.06
						2" Ice	2.3333	2.3333	0.11
						4" Ice	3.3778	3.3778	0.24
(2) LGP21903	A	From Leg	4.0000 0.00 5.00	0.0000	132.0000	No Ice	0.2695	0.1838	0.01
						1/2" Ice	0.3432	0.2483	0.01
						1" Ice	0.4255	0.3216	0.02
						2" Ice	0.6160	0.4940	0.03
						4" Ice	1.1009	0.9425	0.07
(2) LGP21903	B	From Leg	4.0000 0.00	0.0000	132.0000	No Ice	0.2695	0.1838	0.01
						1/2" Ice	0.3432	0.2483	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			5.00			Ice	0.4255	0.3216	0.02
						1" Ice	0.6160	0.4940	0.03
						2" Ice	1.1009	0.9425	0.07
						4" Ice			
(2) LGP21903	C	From Leg	4.0000	0.0000	132.0000	No Ice	0.2695	0.1838	0.01
			0.00			1/2"	0.3432	0.2483	0.01
			5.00			Ice	0.4255	0.3216	0.02
						1" Ice	0.6160	0.4940	0.03
						2" Ice	1.1009	0.9425	0.07
						4" Ice			
Platform Mount [LP 713-1]	C	None		0.0000	132.0000	No Ice	31.2700	31.2700	1.51
						1/2"	39.6800	39.6800	1.93
						Ice	48.0900	48.0900	2.35
						1" Ice	64.9100	64.9100	3.19
						2" Ice	98.5500	98.5500	4.86
						4" Ice			
***									
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	A	From Leg	4.0000	0.0000	126.0000	No Ice	6.9361	3.2893	0.06
			0.00			1/2"	7.4389	3.9953	0.11
			2.00			Ice	7.9415	4.6615	0.16
						1" Ice	8.9779	6.0439	0.28
						2" Ice	11.1750	9.0230	0.65
						4" Ice			
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	B	From Leg	4.0000	0.0000	126.0000	No Ice	6.9361	3.2893	0.06
			0.00			1/2"	7.4389	3.9953	0.11
			2.00			Ice	7.9415	4.6615	0.16
						1" Ice	8.9779	6.0439	0.28
						2" Ice	11.1750	9.0230	0.65
						4" Ice			
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	C	From Leg	4.0000	0.0000	126.0000	No Ice	6.9361	3.2893	0.06
			0.00			1/2"	7.4389	3.9953	0.11
			2.00			Ice	7.9415	4.6615	0.16
						1" Ice	8.9779	6.0439	0.28
						2" Ice	11.1750	9.0230	0.65
						4" Ice			
(2) KRY 112 71	A	From Leg	4.0000	0.0000	126.0000	No Ice	0.6806	0.4497	0.01
			0.00			1/2"	0.8022	0.5590	0.02
			2.00			Ice	0.9325	0.6769	0.03
						1" Ice	1.2190	0.9388	0.04
						2" Ice	1.8956	1.5662	0.11
						4" Ice			
(2) KRY 112 71	B	From Leg	4.0000	0.0000	126.0000	No Ice	0.6806	0.4497	0.01
			0.00			1/2"	0.8022	0.5590	0.02
			2.00			Ice	0.9325	0.6769	0.03
						1" Ice	1.2190	0.9388	0.04
						2" Ice	1.8956	1.5662	0.11
						4" Ice			
(2) KRY 112 71	C	From Leg	4.0000	0.0000	126.0000	No Ice	0.6806	0.4497	0.01
			0.00			1/2"	0.8022	0.5590	0.02
			2.00			Ice	0.9325	0.6769	0.03
						1" Ice	1.2190	0.9388	0.04
						2" Ice	1.8956	1.5662	0.11
						4" Ice			
Side Arm Mount [SO 101-3]	C	None		0.0000	126.0000	No Ice	7.5000	7.5000	0.25
						1/2"	8.9000	8.9000	0.33
						Ice	10.3000	10.3000	0.41
						1" Ice	13.1000	13.1000	0.58
						2" Ice	18.7000	18.7000	0.90
						4" Ice			
******									

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-133.0000	141.2434	1.515	28	24.924	A	0.000	24.924	24.924	100.00	0.000	0.000
					B	0.000	24.924		100.00	0.000	0.000
					C	0.000	24.924		100.00	0.000	3.105
L2 133.0000-123.5000	128.1798	1.474	27	15.895	A	0.000	15.895	15.895	100.00	0.000	0.000
					B	0.000	15.895		100.00	0.000	0.000
					C	0.000	15.895		100.00	0.000	4.272
L3 123.5000-118.7500	121.1085	1.45	27	8.476	A	0.000	8.476	8.476	100.00	0.000	0.000
					B	0.000	8.476		100.00	0.000	0.000
					C	0.000	8.476		100.00	0.000	3.662
L4 118.7500-117.0000	117.8728	1.439	27	3.212	A	0.000	3.212	3.212	100.00	0.000	0.000
					B	0.000	3.212		100.00	0.000	0.000
					C	0.000	3.212		100.00	0.000	1.349
L5 117.0000-95.1670	105.7762	1.395	26	44.091	A	0.000	44.091	44.091	100.00	0.000	0.000
					B	0.000	44.091		100.00	0.000	0.000
					C	0.000	44.091		100.00	0.000	16.833
L6 95.1670-93.7500	94.4562	1.35	25	3.061	A	0.000	3.061	3.061	100.00	0.000	0.000
					B	0.000	3.061		100.00	0.000	0.000
					C	0.000	3.061		100.00	0.000	1.093
L7 93.7500-92.7500	93.2494	1.346	25	2.189	A	0.000	2.189	2.189	100.00	0.000	0.000
					B	0.000	2.189		100.00	0.000	0.000
					C	0.000	2.189		100.00	0.000	0.771
L8 92.7500-92.0000	92.3747	1.342	25	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	0.578
L9 92.0000-86.5000	89.2325	1.329	25	12.382	A	0.000	12.382	12.382	100.00	0.000	0.000
					B	0.000	12.382		100.00	0.000	0.000
					C	0.000	12.382		100.00	0.000	4.240
L10 86.5000-85.7500	86.1247	1.315	24	1.725	A	0.000	1.725	1.725	100.00	0.000	0.000
					B	0.000	1.725		100.00	0.000	0.000
					C	0.000	1.725		100.00	0.000	0.578
L11 85.7500-68.0833	76.7503	1.273	24	43.180	A	0.000	43.180	43.180	100.00	0.000	0.000
					B	0.000	43.180		100.00	0.000	0.000
					C	0.000	43.180		100.00	0.000	13.621
L12 68.0833-66.7500	67.4158	1.226	23	3.457	A	0.000	3.457	3.457	100.00	0.000	0.000
					B	0.000	3.457		100.00	0.000	0.000
					C	0.000	3.457		100.00	0.000	1.028
L13 66.7500-63.2500	64.9939	1.214	22	9.207	A	0.000	9.207	9.207	100.00	0.000	0.000
					B	0.000	9.207		100.00	0.000	0.000
					C	0.000	9.207		100.00	0.000	2.699
L14 63.2500-62.7500	62.9999	1.203	22	1.331	A	0.000	1.331	1.331	100.00	0.000	0.000
					B	0.000	1.331		100.00	0.000	0.000
					C	0.000	1.331		100.00	0.000	0.386
L15 62.7500-56.2500	59.4797	1.183	22	17.657	A	0.000	17.657	17.657	100.00	0.000	0.000
					B	0.000	17.657		100.00	0.000	0.000
					C	0.000	17.657		100.00	0.000	5.011
L16 56.2500-44.6670	50.3973	1.129	21	33.102	A	0.000	33.102	33.102	100.00	0.000	0.000
					B	0.000	33.102		100.00	0.000	0.000
					C	0.000	33.102		100.00	0.000	8.930
L17 44.6670-35.5000	40.0326	1.057	20	26.964	A	0.000	26.964	26.964	100.00	0.000	0.000
					B	0.000	26.964		100.00	0.000	0.000
					C	0.000	26.964		100.00	0.000	7.141
L18 35.5000-34.2500	34.8743	1.016	19	3.812	A	0.000	3.812	3.812	100.00	0.000	0.000
					B	0.000	3.812		100.00	0.000	0.000
					C	0.000	3.812		100.00	0.000	1.016
L19 34.2500-33.2500	33.7496	1.006	19	3.067	A	0.000	3.067	3.067	100.00	0.000	0.000
					B	0.000	3.067		100.00	0.000	0.000
					C	0.000	3.067		100.00	0.000	0.813
L20 33.2500-26.2500	29.7296	1	18	21.905	A	0.000	21.905	21.905	100.00	0.000	0.000
					B	0.000	21.905		100.00	0.000	0.000
					C	0.000	21.905		100.00	0.000	5.689
L21 26.2500-	25.7496	1	18	3.192	A	0.000	3.192	3.192	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
25.2500					B	0.000	3.192		100.00	0.000	0.000
					C	0.000	3.192		100.00	0.000	0.813
L22 25.2500-12.2500	18.6833	1	18	42.915	A	0.000	42.915	42.915	100.00	0.000	0.000
					B	0.000	42.915		100.00	0.000	0.000
					C	0.000	42.915		100.00	0.000	10.148
L23 12.2500-9.2500	10.7466	1	18	10.279	A	0.000	10.279	10.279	100.00	0.000	0.000
					B	0.000	10.279		100.00	0.000	0.000
					C	0.000	10.279		100.00	0.000	2.313
L24 9.2500-3.0000	6.1105	1	18	21.865	A	0.000	21.865	21.865	100.00	0.000	0.000
					B	0.000	21.865		100.00	0.000	0.000
					C	0.000	21.865		100.00	0.000	4.819
L25 3.0000-0.0000	1.4967	1	18	10.712	A	0.000	10.712	10.712	100.00	0.000	0.000
					B	0.000	10.712		100.00	0.000	0.000
					C	0.000	10.712		100.00	0.000	2.313

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-133.0000	141.2434	1.515	5	0.8930	27.454	A	0.000	27.454	27.454	100.00	0.000	0.000
						B	0.000	27.454		100.00	0.000	0.000
						C	0.000	27.454		100.00	0.000	6.003
L2 133.0000-123.5000	128.1798	1.474	5	0.8826	17.292	A	0.000	17.292	17.292	100.00	0.000	0.000
						B	0.000	17.292		100.00	0.000	0.000
						C	0.000	17.292		100.00	0.000	8.548
L3 123.5000-118.7500	121.1085	1.45	5	0.8766	9.170	A	0.000	9.170	9.170	100.00	0.000	0.000
						B	0.000	9.170		100.00	0.000	0.000
						C	0.000	9.170		100.00	0.000	7.179
L4 118.7500-117.0000	117.8728	1.439	5	0.8738	3.467	A	0.000	3.467	3.467	100.00	0.000	0.000
						B	0.000	3.467		100.00	0.000	0.000
						C	0.000	3.467		100.00	0.000	2.641
L5 117.0000-95.1670	105.7762	1.395	5	0.8625	47.229	A	0.000	47.229	47.229	100.00	0.000	0.000
						B	0.000	47.229		100.00	0.000	0.000
						C	0.000	47.229		100.00	0.000	32.735
L6 95.1670-93.7500	94.4562	1.35	5	0.8509	3.265	A	0.000	3.265	3.265	100.00	0.000	0.000
						B	0.000	3.265		100.00	0.000	0.000
						C	0.000	3.265		100.00	0.000	2.125
L7 93.7500-92.7500	93.2494	1.346	5	0.8496	2.330	A	0.000	2.330	2.330	100.00	0.000	0.000
						B	0.000	2.330		100.00	0.000	0.000
						C	0.000	2.330		100.00	0.000	1.488
L8 92.7500-92.0000	92.3747	1.342	5	0.8486	1.758	A	0.000	1.758	1.758	100.00	0.000	0.000
						B	0.000	1.758		100.00	0.000	0.000
						C	0.000	1.758		100.00	0.000	1.116
L9 92.0000-86.5000	89.2325	1.329	5	0.8451	13.157	A	0.000	13.157	13.157	100.00	0.000	0.000
						B	0.000	13.157		100.00	0.000	0.000
						C	0.000	13.157		100.00	0.000	8.165
L10 86.5000-85.7500	86.1247	1.315	5	0.8415	1.830	A	0.000	1.830	1.830	100.00	0.000	0.000
						B	0.000	1.830		100.00	0.000	0.000
						C	0.000	1.830		100.00	0.000	1.111
L11 85.7500-68.0833	76.7503	1.273	5	0.8299	45.623	A	0.000	45.623	45.623	100.00	0.000	0.000
						B	0.000	45.623		100.00	0.000	0.000
						C	0.000	45.623		100.00	0.000	26.003
L12 68.0833-66.7500	67.4158	1.226	4	0.8171	3.638	A	0.000	3.638	3.638	100.00	0.000	0.000
						B	0.000	3.638		100.00	0.000	0.000
						C	0.000	3.638		100.00	0.000	1.948
L13 66.7500-63.2500	64.9939	1.214	4	0.8136	9.681	A	0.000	9.681	9.681	100.00	0.000	0.000
						B	0.000	9.681		100.00	0.000	0.000
						C	0.000	9.681		100.00	0.000	5.103
L14 63.2500-62.7500	62.9999	1.203	4	0.8105	1.398	A	0.000	1.398	1.398	100.00	0.000	0.000
						B	0.000	1.398		100.00	0.000	0.000
						C	0.000	1.398		100.00	0.000	0.728

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
L15 62.7500-56.2500	59.4797	1.183	4	0.8049	18.529	A	0.000	18.529	18.529	100.00	0.000	0.000
						B	0.000	18.529		100.00	0.000	0.000
						C	0.000	18.529		100.00	0.000	9.430
L16 56.2500-44.6670	50.3973	1.129	4	0.7891	34.625	A	0.000	34.625	34.625	100.00	0.000	0.000
						B	0.000	34.625		100.00	0.000	0.000
						C	0.000	34.625		100.00	0.000	16.649
L17 44.6670-35.5000	40.0326	1.057	4	0.7676	28.170	A	0.000	28.170	28.170	100.00	0.000	0.000
						B	0.000	28.170		100.00	0.000	0.000
						C	0.000	28.170		100.00	0.000	13.249
L18 35.5000-34.2500	34.8743	1.016	4	0.7550	3.969	A	0.000	3.969	3.969	100.00	0.000	0.000
						B	0.000	3.969		100.00	0.000	0.000
						C	0.000	3.969		100.00	0.000	1.813
L19 34.2500-33.2500	33.7496	1.006	4	0.7520	3.192	A	0.000	3.192	3.192	100.00	0.000	0.000
						B	0.000	3.192		100.00	0.000	0.000
						C	0.000	3.192		100.00	0.000	1.448
L20 33.2500-26.2500	29.7296	1	4	0.7500	22.780	A	0.000	22.780	22.780	100.00	0.000	0.000
						B	0.000	22.780		100.00	0.000	0.000
						C	0.000	22.780		100.00	0.000	10.122
L21 26.2500-25.2500	25.7496	1	4	0.7500	3.317	A	0.000	3.317	3.317	100.00	0.000	0.000
						B	0.000	3.317		100.00	0.000	0.000
						C	0.000	3.317		100.00	0.000	1.446
L22 25.2500-12.2500	18.6833	1	4	0.7500	44.540	A	0.000	44.540	44.540	100.00	0.000	0.000
						B	0.000	44.540		100.00	0.000	0.000
						C	0.000	44.540		100.00	0.000	18.381
L23 12.2500-9.2500	10.7466	1	4	0.7500	10.654	A	0.000	10.654	10.654	100.00	0.000	0.000
						B	0.000	10.654		100.00	0.000	0.000
						C	0.000	10.654		100.00	0.000	4.213
L24 9.2500-3.0000	6.1105	1	4	0.7500	22.647	A	0.000	22.647	22.647	100.00	0.000	0.000
						B	0.000	22.647		100.00	0.000	0.000
						C	0.000	22.647		100.00	0.000	8.777
L25 3.0000-0.0000	1.4967	1	4	0.7500	11.087	A	0.000	11.087	11.087	100.00	0.000	0.000
						B	0.000	11.087		100.00	0.000	0.000
						C	0.000	11.087		100.00	0.000	4.213

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-133.0000	141.2434	1.515	10	24.924	A	0.000	24.924	24.924	100.00	0.000	0.000
					B	0.000	24.924		100.00	0.000	0.000
					C	0.000	24.924		100.00	0.000	3.105
L2 133.0000-123.5000	128.1798	1.474	9	15.895	A	0.000	15.895	15.895	100.00	0.000	0.000
					B	0.000	15.895		100.00	0.000	0.000
					C	0.000	15.895		100.00	0.000	4.272
L3 123.5000-118.7500	121.1085	1.45	9	8.476	A	0.000	8.476	8.476	100.00	0.000	0.000
					B	0.000	8.476		100.00	0.000	0.000
					C	0.000	8.476		100.00	0.000	3.662
L4 118.7500-117.0000	117.8728	1.439	9	3.212	A	0.000	3.212	3.212	100.00	0.000	0.000
					B	0.000	3.212		100.00	0.000	0.000
					C	0.000	3.212		100.00	0.000	1.349
L5 117.0000-95.1670	105.7762	1.395	9	44.091	A	0.000	44.091	44.091	100.00	0.000	0.000
					B	0.000	44.091		100.00	0.000	0.000
					C	0.000	44.091		100.00	0.000	16.833
L6 95.1670-93.7500	94.4562	1.35	9	3.061	A	0.000	3.061	3.061	100.00	0.000	0.000
					B	0.000	3.061		100.00	0.000	0.000
					C	0.000	3.061		100.00	0.000	1.093
L7 93.7500-92.7500	93.2494	1.346	9	2.189	A	0.000	2.189	2.189	100.00	0.000	0.000
					B	0.000	2.189		100.00	0.000	0.000
					C	0.000	2.189		100.00	0.000	0.771

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
L8 92.7500-92.0000	92.3747	1.342	9	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	0.578
L9 92.0000-86.5000	89.2325	1.329	9	12.382	A	0.000	12.382	12.382	100.00	0.000	0.000
					B	0.000	12.382		100.00	0.000	0.000
					C	0.000	12.382		100.00	0.000	4.240
L10 86.5000-85.7500	86.1247	1.315	8	1.725	A	0.000	1.725	1.725	100.00	0.000	0.000
					B	0.000	1.725		100.00	0.000	0.000
					C	0.000	1.725		100.00	0.000	0.578
L11 85.7500-68.0833	76.7503	1.273	8	43.180	A	0.000	43.180	43.180	100.00	0.000	0.000
					B	0.000	43.180		100.00	0.000	0.000
					C	0.000	43.180		100.00	0.000	13.621
L12 68.0833-66.7500	67.4158	1.226	8	3.457	A	0.000	3.457	3.457	100.00	0.000	0.000
					B	0.000	3.457		100.00	0.000	0.000
					C	0.000	3.457		100.00	0.000	1.028
L13 66.7500-63.2500	64.9939	1.214	8	9.207	A	0.000	9.207	9.207	100.00	0.000	0.000
					B	0.000	9.207		100.00	0.000	0.000
					C	0.000	9.207		100.00	0.000	2.699
L14 63.2500-62.7500	62.9999	1.203	8	1.331	A	0.000	1.331	1.331	100.00	0.000	0.000
					B	0.000	1.331		100.00	0.000	0.000
					C	0.000	1.331		100.00	0.000	0.386
L15 62.7500-56.2500	59.4797	1.183	8	17.657	A	0.000	17.657	17.657	100.00	0.000	0.000
					B	0.000	17.657		100.00	0.000	0.000
					C	0.000	17.657		100.00	0.000	5.011
L16 56.2500-44.6670	50.3973	1.129	7	33.102	A	0.000	33.102	33.102	100.00	0.000	0.000
					B	0.000	33.102		100.00	0.000	0.000
					C	0.000	33.102		100.00	0.000	8.930
L17 44.6670-35.5000	40.0326	1.057	7	26.964	A	0.000	26.964	26.964	100.00	0.000	0.000
					B	0.000	26.964		100.00	0.000	0.000
					C	0.000	26.964		100.00	0.000	7.141
L18 35.5000-34.2500	34.8743	1.016	7	3.812	A	0.000	3.812	3.812	100.00	0.000	0.000
					B	0.000	3.812		100.00	0.000	0.000
					C	0.000	3.812		100.00	0.000	1.016
L19 34.2500-33.2500	33.7496	1.006	6	3.067	A	0.000	3.067	3.067	100.00	0.000	0.000
					B	0.000	3.067		100.00	0.000	0.000
					C	0.000	3.067		100.00	0.000	0.813
L20 33.2500-26.2500	29.7296	1	6	21.905	A	0.000	21.905	21.905	100.00	0.000	0.000
					B	0.000	21.905		100.00	0.000	0.000
					C	0.000	21.905		100.00	0.000	5.689
L21 26.2500-25.2500	25.7496	1	6	3.192	A	0.000	3.192	3.192	100.00	0.000	0.000
					B	0.000	3.192		100.00	0.000	0.000
					C	0.000	3.192		100.00	0.000	0.813
L22 25.2500-12.2500	18.6833	1	6	42.915	A	0.000	42.915	42.915	100.00	0.000	0.000
					B	0.000	42.915		100.00	0.000	0.000
					C	0.000	42.915		100.00	0.000	10.148
L23 12.2500-9.2500	10.7466	1	6	10.279	A	0.000	10.279	10.279	100.00	0.000	0.000
					B	0.000	10.279		100.00	0.000	0.000
					C	0.000	10.279		100.00	0.000	2.313
L24 9.2500-3.0000	6.1105	1	6	21.865	A	0.000	21.865	21.865	100.00	0.000	0.000
					B	0.000	21.865		100.00	0.000	0.000
					C	0.000	21.865		100.00	0.000	4.819
L25 3.0000-0.0000	1.4967	1	6	10.712	A	0.000	10.712	10.712	100.00	0.000	0.000
					B	0.000	10.712		100.00	0.000	0.000
					C	0.000	10.712		100.00	0.000	2.313

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	150 - 133	Pole	Max Tension	24	0.00	-0.00	0.00
			Max. Compression	14	-6.97	0.51	-0.25
			Max. Mx	11	-2.27	158.28	-1.23
			Max. My	8	-2.29	1.32	-156.84
			Max. Vy	11	-10.34	158.28	-1.23
			Max. Vx	2	-10.26	-1.03	156.68

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	13			0.55
L2	133 - 123.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-14.05	0.54	-0.02
			Max. Mx	11	-5.87	329.31	-1.84
			Max. My	2	-5.89	-1.68	327.02
			Max. Vy	11	-17.91	329.31	-1.84
			Max. Vx	2	-17.83	-1.68	327.02
			Max. Torque	13			0.55
L3	123.5 - 118.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.13	0.57	-0.04
			Max. Mx	11	-6.81	415.85	-2.18
			Max. My	2	-6.82	-2.00	413.17
			Max. Vy	11	-18.54	415.85	-2.18
			Max. Vx	2	-18.45	-2.00	413.17
			Max. Torque	8			-0.57
L4	118.75 - 117	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.63	0.59	-0.04
			Max. Mx	11	-7.25	448.50	-2.30
			Max. My	2	-7.27	-2.12	445.67
			Max. Vy	11	-18.78	448.50	-2.30
			Max. Vx	8	18.70	2.48	-445.66
			Max. Torque	8			-0.58
L5	117 - 95.167	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.55	0.71	-0.12
			Max. Mx	11	-10.71	796.61	-3.57
			Max. My	8	-10.73	3.77	-792.32
			Max. Vy	11	-21.04	796.61	-3.57
			Max. Vx	2	-20.96	-3.32	792.30
			Max. Torque	8			-0.71
L6	95.167 - 93.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21.98	0.75	-0.14
			Max. Mx	11	-12.84	920.15	-3.98
			Max. My	8	-12.85	4.19	-915.39
			Max. Vy	11	-21.91	920.15	-3.98
			Max. Vx	2	-21.83	-3.72	915.35
			Max. Torque	8			-0.76
L7	93.75 - 92.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-22.29	0.76	-0.15
			Max. Mx	11	-13.13	942.13	-4.06
			Max. My	8	-13.14	4.27	-937.29
			Max. Vy	11	-22.05	942.13	-4.06
			Max. Vx	2	-21.97	-3.79	937.24
			Max. Torque	8			-0.76
L8	92.75 - 92	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-22.57	0.77	-0.15
			Max. Mx	11	-13.38	958.70	-4.11
			Max. My	8	-13.40	4.32	-953.80
			Max. Vy	11	-22.15	958.70	-4.11
			Max. Vx	2	-22.07	-3.84	953.75
			Max. Torque	8			-0.77
L9	92 - 86.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.15	0.81	-0.17
			Max. Mx	11	-14.82	1082.54	-4.51
			Max. My	8	-14.84	4.73	-1077.17
			Max. Vy	11	-22.89	1082.54	-4.51
			Max. Vx	2	-22.80	-4.22	1077.11
			Max. Torque	8			-0.81
L10	86.5 - 85.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.46	0.82	-0.18
			Max. Mx	11	-15.11	1099.74	-4.57
			Max. My	8	-15.12	4.79	-1094.31
			Max. Vy	11	-22.99	1099.74	-4.57
			Max. Vx	2	-22.91	-4.27	1094.25
			Max. Torque	8			-0.82
L11	85.75 - 68.0833	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-29.86	0.97	-0.26
			Max. Mx	11	-20.08	1526.08	-5.85
			Max. My	8	-20.09	6.10	-1519.17
			Max. Vy	11	-25.31	1526.08	-5.85
			Max. Vx	2	-25.22	-5.49	1519.07
			Max. Torque	8			-0.96
L12	68.0833 - 66.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30.32	0.98	-0.27
			Max. Mx	11	-20.50	1559.92	-5.95
			Max. My	8	-20.51	6.20	-1552.91
			Max. Vy	11	-25.48	1559.92	-5.95
			Max. Vx	2	-25.40	-5.58	1552.80
			Max. Torque	8			-0.98
L13	66.75 - 63.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-31.75	1.01	-0.29
			Max. Mx	11	-21.84	1649.90	-6.21
			Max. My	8	-21.85	6.46	-1642.60
			Max. Vy	11	-25.95	1649.90	-6.21
			Max. Vx	2	-25.87	-5.83	1642.48
			Max. Torque	8			-1.00
L14	63.25 - 62.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-31.99	1.01	-0.29
			Max. Mx	11	-22.07	1662.90	-6.24
			Max. My	8	-22.08	6.50	-1655.55
			Max. Vy	11	-26.02	1662.90	-6.24
			Max. Vx	2	-25.94	-5.86	1655.42
			Max. Torque	8			-1.01
L15	62.75 - 56.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-34.42	1.07	-0.32
			Max. Mx	11	-24.32	1834.72	-6.72
			Max. My	8	-24.33	6.98	-1826.83
			Max. Vy	11	-26.86	1834.72	-6.72
			Max. Vx	2	-26.78	-6.31	1826.69
			Max. Torque	8			-1.06
L16	56.25 - 44.667	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-36.66	1.13	-0.36
			Max. Mx	11	-26.42	2004.93	-7.17
			Max. My	8	-26.42	7.45	-1996.52
			Max. Vy	11	-27.62	2004.93	-7.17
			Max. Vx	2	-27.54	-6.74	1996.36
			Max. Torque	8			-1.12
L17	44.667 - 35.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-43.95	1.27	-0.44
			Max. Mx	11	-33.15	2419.01	-8.23
			Max. My	8	-33.15	8.52	-2409.39
			Max. Vy	11	-29.41	2419.01	-8.23
			Max. Vx	2	-29.33	-7.73	2409.18
			Max. Torque	8			-1.24
L18	35.5 - 34.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-44.44	1.28	-0.45
			Max. Mx	11	-33.61	2455.84	-8.32
			Max. My	8	-33.62	8.61	-2446.12
			Max. Vy	11	-29.55	2455.84	-8.32
			Max. Vx	2	-29.47	-7.81	2445.90
			Max. Torque	8			-1.25
L19	34.25 - 33.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-44.94	1.29	-0.45
			Max. Mx	11	-34.08	2485.43	-8.39
			Max. My	8	-34.09	8.69	-2475.62
			Max. Vy	11	-29.66	2485.43	-8.39
			Max. Vx	2	-29.58	-7.88	2475.41
			Max. Torque	7			-1.26

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L20	33.25 - 26.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-47.56	1.36	-0.49
			Max. Mx	11	-36.57	2695.54	-8.90
			Max. My	8	-36.58	9.20	-2685.15
			Max. Vy	11	-30.39	2695.54	-8.90
			Max. Vx	2	-30.31	-8.36	2684.91
			Max. Torque	7			-1.33
L21	26.25 - 25.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-48.07	1.37	-0.50
			Max. Mx	11	-37.06	2725.98	-8.97
			Max. My	8	-37.06	9.27	-2715.51
			Max. Vy	11	-30.51	2725.98	-8.97
			Max. Vx	2	-30.42	-8.42	2715.26
			Max. Torque	7			-1.34
L22	25.25 - 12.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-53.49	1.51	-0.58
			Max. Mx	11	-42.19	3131.42	-9.90
			Max. My	8	-42.19	10.22	-3119.88
			Max. Vy	11	-31.90	3131.42	-9.90
			Max. Vx	2	-31.82	-9.29	3119.59
			Max. Torque	7			-1.47
L23	12.25 - 9.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-54.72	1.54	-0.59
			Max. Mx	11	-43.35	3227.54	-10.11
			Max. My	8	-43.35	10.44	-3215.76
			Max. Vy	11	-32.21	3227.54	-10.11
			Max. Vx	2	-32.13	-9.49	3215.46
			Max. Torque	7			-1.51
L24	9.25 - 3	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-57.31	1.61	-0.63
			Max. Mx	11	-45.82	3430.81	-10.55
			Max. My	8	-45.82	10.89	-3418.53
			Max. Vy	11	-32.87	3430.81	-10.55
			Max. Vx	2	-32.79	-9.90	3418.20
			Max. Torque	7			-1.57
L25	3 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-58.67	1.64	-0.65
			Max. Mx	11	-47.10	3529.86	-10.76
			Max. My	8	-47.10	11.10	-3517.33
			Max. Vy	11	-33.19	3529.86	-10.76
			Max. Vx	2	-33.11	-10.10	3516.99
			Max. Torque	7			-1.61

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 133	35.822	35	2.3393	0.0042
L2	133 - 123.5	27.824	35	2.0622	0.0021
L3	123.5 - 118.75	23.884	35	1.8877	0.0017
L4	118.75 - 117	22.038	35	1.8236	0.0015
L5	117 - 95.167	21.373	35	1.8044	0.0015
L6	99.5 - 93.75	15.332	35	1.4853	0.0011
L7	93.75 - 92.75	13.578	35	1.4192	0.0010
L8	92.75 - 92	13.282	35	1.4041	0.0010
L9	92 - 86.5	13.062	35	1.3947	0.0010
L10	86.5 - 85.75	11.511	35	1.3001	0.0009
L11	85.75 - 68.0833	11.307	35	1.2911	0.0009
L12	68.0833 - 66.75	7.099	35	0.9848	0.0006
L13	66.75 - 63.25	6.827	35	0.9635	0.0006
L14	63.25 - 62.75	6.138	35	0.9176	0.0006
L15	62.75 - 56.25	6.042	35	0.9121	0.0006

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L16	56.25 - 44.667	4.866	35	0.8155	0.0005
L17	50 - 35.5	3.864	35	0.7165	0.0005
L18	35.5 - 34.25	1.937	35	0.5274	0.0003
L19	34.25 - 33.25	1.802	35	0.5085	0.0003
L20	33.25 - 26.25	1.696	35	0.4967	0.0003
L21	26.25 - 25.25	1.052	35	0.3824	0.0002
L22	25.25 - 12.25	0.973	35	0.3709	0.0002
L23	12.25 - 9.25	0.226	35	0.1798	0.0001
L24	9.25 - 3	0.127	35	0.1342	0.0001
L25	3 - 0	0.013	35	0.0408	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.0000	(2) HBXX-6517DS-A2M w/ Mount Pipe	35	34.363	2.2937	0.0038	7129
132.0000	(2) 7770.00 w/ Mount Pipe	35	27.389	2.0434	0.0021	2308
126.0000	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	35	24.884	1.9302	0.0018	3111

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 133	103.041	10	6.7337	0.0120
L2	133 - 123.5	80.089	10	5.9395	0.0059
L3	123.5 - 118.75	68.768	10	5.4383	0.0047
L4	118.75 - 117	63.462	10	5.2537	0.0044
L5	117 - 95.167	61.551	10	5.1986	0.0043
L6	99.5 - 93.75	44.174	10	4.2807	0.0031
L7	93.75 - 92.75	39.125	10	4.0903	0.0029
L8	92.75 - 92	38.274	10	4.0470	0.0029
L9	92 - 86.5	37.641	10	4.0198	0.0029
L10	86.5 - 85.75	33.174	10	3.7475	0.0026
L11	85.75 - 68.0833	32.588	10	3.7216	0.0026
L12	68.0833 - 66.75	20.467	10	2.8393	0.0019
L13	66.75 - 63.25	19.683	10	2.7781	0.0018
L14	63.25 - 62.75	17.697	10	2.6458	0.0017
L15	62.75 - 56.25	17.421	10	2.6299	0.0017
L16	56.25 - 44.667	14.032	10	2.3516	0.0015
L17	50 - 35.5	11.142	10	2.0663	0.0013
L18	35.5 - 34.25	5.587	10	1.5211	0.0009
L19	34.25 - 33.25	5.196	10	1.4667	0.0009
L20	33.25 - 26.25	4.893	10	1.4325	0.0009
L21	26.25 - 25.25	3.035	10	1.1029	0.0007
L22	25.25 - 12.25	2.808	10	1.0698	0.0006
L23	12.25 - 9.25	0.651	10	0.5188	0.0003
L24	9.25 - 3	0.367	10	0.3873	0.0002
L25	3 - 0	0.037	10	0.1178	0.0001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.0000	(2) HBXX-6517DS-A2M w/ Mount Pipe	10	98.856	6.6033	0.0110	2552
132.0000	(2) 7770.00 w/ Mount Pipe	10	78.839	5.8856	0.0061	823
126.0000	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	10	71.641	5.5604	0.0052	1104

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	150 - 133 (1)	TP19.1871x16x0.1875	17.0000	0.0000	0.0	39.000	11.4710	-2.27	447.37	0.005
L2	133 - 123.5 (2)	TP20.9682x19.1871x0.422	9.5000	0.0000	0.0	28.470	27.9177	-5.87	794.82	0.007
L3	123.5 - 118.75 (3)	TP21.8587x20.9682x0.753 5	4.7500	0.0000	0.0	28.506	51.2043	-6.80	1459.63	0.005
L4	118.75 - 117 (4)	TP22.1868x21.8587x1.000 3	1.7500	0.0000	0.0	28.536	68.2390	-7.24	1947.27	0.004
L5	117 - 95.167 (5)	TP26.28x22.1868x0.6518	21.8330	0.0000	0.0	28.698	52.0803	-10.71	1494.60	0.007
L6	95.167 - 93.75 (6)	TP26.1715x24.1641x0.775 5	5.7500	0.0000	0.0	28.734	62.1813	-12.51	1786.72	0.007
L7	93.75 - 92.75 (7)	TP26.3591x26.1715x0.904 9	1.0000	0.0000	0.0	27.360	74.1655	-13.12	2029.17	0.006
L8	92.75 - 92 (8)	TP26.4998x26.3591x1.111 9	0.7500	0.0000	0.0	27.348	90.8983	-13.38	2485.89	0.005
L9	92 - 86.5 (9)	TP27.5317x26.4998x0.792 5	5.5000	0.0000	0.0	27.396	68.2376	-14.82	1869.44	0.008
L10	86.5 - 85.75 (10)	TP27.6724x27.5317x1.182 3	0.7500	0.0000	0.0	27.384	100.845 0	-15.10	2761.53	0.005
L11	85.75 - 68.0833 (11)	TP30.9868x27.6724x0.779 6	17.6667	0.0000	0.0	28.902	75.8248	-20.08	2191.49	0.009
L12	68.0833 - 66.75 (12)	TP31.237x30.9868x0.8295	1.3333	0.0000	0.0	31.638	81.2190	-20.50	2569.61	0.008
L13	66.75 - 63.25 (13)	TP31.8936x31.237x1.0345	3.5000	0.0000	0.0	31.398	102.790 0	-21.84	3227.39	0.007
L14	63.25 - 62.75 (14)	TP31.9874x31.8936x1.247 7	0.5000	0.0000	0.0	28.482	123.498 0	-22.07	3517.46	0.006
L15	62.75 - 56.25 (15)	TP33.2069x31.9874x0.888 1	6.5000	0.0000	0.0	28.530	92.4255	-24.32	2636.90	0.009
L16	56.25 - 44.667 (16)	TP35.38x33.2069x0.8131	11.5830	0.0000	0.0	31.710	87.8776	-26.41	2786.60	0.009
L17	44.667 - 35.5 (17)	TP36.4734x32.7534x0.846 2	14.5000	0.0000	0.0	31.776	90.6623	-29.84	2880.89	0.010
L18	35.5 - 34.25 (18)	TP36.7078x36.4734x0.842 5	1.2500	0.0000	0.0	31.764	97.2971	-33.61	3090.55	0.011
L19	34.25 - 33.25 (19)	TP36.8953x36.7078x1.091 7	1.0000	0.0000	0.0	31.794	125.854 0	-34.08	4001.40	0.009
L20	33.25 - 26.25 (20)	TP38.2079x36.8953x0.766 3	7.0000	0.0000	0.0	31.818	92.3889	-36.57	2939.63	0.012
L21	26.25 - 25.25 (21)	TP38.3954x38.2079x1.094 4	1.0000	0.0000	0.0	31.818	131.443 0	-37.06	4182.25	0.009
L22	25.25 - 12.25 (22)	TP40.833x38.3954x0.8201	13.0000	0.0000	0.0	31.860	105.662 0	-42.19	3366.38	0.013
L23	12.25 - 9.25 (23)	TP41.3955x40.833x0.7657	3.0000	0.0000	0.0	33.468	100.174 0	-43.35	3352.62	0.013
L24	9.25 - 3 (24)	TP42.5675x41.3955x0.764 8	6.2500	0.0000	0.0	33.174	102.940 0	-45.81	3414.94	0.013
L25	3 - 0 (25)	TP43.13x42.5675x0.828	3.0000	0.0000	0.0	31.020	112.777 0	-47.10	3498.35	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	150 - 133 (1)	TP19.1871x16x0.1875	158.97	35.872	39.000	0.920	0.00	0.000	39.000	0.000
L2	133 - 123.5 (2)	TP20.9682x19.1871x0.422	330.33	28.622	28.470	1.005	0.00	0.000	28.470	0.000
L3	123.5 - 118.75 (3)	TP21.8587x20.9682x0.7535	417.07	19.466	28.506	0.683	0.00	0.000	28.506	0.000
L4	118.75 - 117 (4)	TP22.1868x21.8587x1.0003	449.79	15.866	28.536	0.556	0.00	0.000	28.536	0.000
L5	117 - 95.167 (5)	TP26.28x22.1868x0.6518	798.62	30.883	28.698	1.076	0.00	0.000	28.698	0.000
L6	95.167 - 93.75 (6)	TP26.1715x24.1641x0.7755	891.43	28.910	28.734	1.006	0.00	0.000	28.734	0.000
L7	93.75 - 92.75 (7)	TP26.3591x26.1715x0.9049	944.42	25.229	27.360	0.922	0.00	0.000	27.360	0.000
L8	92.75 - 92 (8)	TP26.4998x26.3591x1.1119	961.02	21.169	27.348	0.774	0.00	0.000	27.348	0.000
L9	92 - 86.5 (9)	TP27.5317x26.4998x0.7925	1085.08	29.820	27.396	1.088	0.00	0.000	27.396	0.000
L10	86.5 - 85.75 (10)	TP27.6724x27.5317x1.1823	1102.32	20.992	27.384	0.767	0.00	0.000	27.384	0.000
L11	85.75 - 68.0833 (11)	TP30.9868x27.6724x0.7796	1529.39	33.357	28.902	1.154	0.00	0.000	28.902	0.000
L12	68.0833 - 66.75 (12)	TP31.237x30.9868x0.8295	1563.29	31.668	31.638	1.001	0.00	0.000	31.638	0.000
L13	66.75 - 63.25 (13)	TP31.8936x31.237x1.0345	1653.42	26.236	31.398	0.836	0.00	0.000	31.398	0.000
L14	63.25 - 62.75 (14)	TP31.9874x31.8936x1.2477	1666.43	22.245	28.482	0.781	0.00	0.000	28.482	0.000
L15	62.75 - 56.25 (15)	TP33.2069x31.9874x0.8881	1838.53	30.798	28.530	1.079	0.00	0.000	28.530	0.000
L16	56.25 - 44.667 (16)	TP35.38x33.2069x0.8131	2009.00	33.971	31.710	1.071	0.00	0.000	31.710	0.000
L17	44.667 - 35.5 (17)	TP36.4734x32.7534x0.8462	2158.53	35.730	31.776	1.124	0.00	0.000	31.776	0.000
L18	35.5 - 34.25 (18)	TP36.7078x36.4734x0.8425	2460.56	35.145	31.764	1.106	0.00	0.000	31.764	0.000
L19	34.25 - 33.25 (19)	TP36.8953x36.7078x1.0917	2490.19	27.734	31.794	0.872	0.00	0.000	31.794	0.000
L20	33.25 - 26.25 (20)	TP38.2079x36.8953x0.7663	2700.59	38.798	31.818	1.219	0.00	0.000	31.818	0.000
L21	26.25 - 25.25 (21)	TP38.3954x38.2079x1.0944	2731.07	27.923	31.818	0.878	0.00	0.000	31.818	0.000
L22	25.25 - 12.25 (22)	TP40.833x38.3954x0.8201	3137.04	36.876	31.860	1.157	0.00	0.000	31.860	0.000
L23	12.25 - 9.25 (23)	TP41.3955x40.833x0.7657	3233.28	39.416	33.468	1.178	0.00	0.000	33.468	0.000
L24	9.25 - 3 (24)	TP42.5675x41.3955x0.7648	3436.81	39.606	33.174	1.194	0.00	0.000	33.174	0.000
L25	3 - 0 (25)	TP43.13x42.5675x0.828	3535.97	36.802	31.020	1.186	0.00	0.000	31.020	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	150 - 133 (1)	TP19.1871x16x0.1875	10.38	0.905	26.000	0.071	0.03	0.003	26.000	0.000
L2	133 - 123.5 (2)	TP20.9682x19.1871x0.422	17.95	0.643	18.980	0.069	0.32	0.013	18.980	0.001
L3	123.5 -	TP21.8587x20.9682x0.75	18.58	0.363	19.004	0.039	0.32	0.007	19.004	0.000

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	118.75 (3)	35								
L4	118.75 - 117 (4)	TP22.1868x21.8587x1.0003	18.82	0.276	19.024	0.029	0.32	0.005	19.024	0.000
L5	117 - 95.167 (5)	TP26.28x22.1868x0.6518	21.08	0.405	19.132	0.043	0.32	0.006	19.132	0.000
L6	95.167 - 93.75 (6)	TP26.1715x24.1641x0.7755	21.95	0.353	19.156	0.037	0.32	0.005	19.156	0.000
L7	93.75 - 92.75 (7)	TP26.3591x26.1715x0.9049	22.09	0.298	18.240	0.033	0.32	0.004	18.240	0.000
L8	92.75 - 92 (8)	TP26.4998x26.3591x1.1119	22.19	0.244	18.232	0.027	0.32	0.003	18.232	0.000
L9	92 - 86.5 (9)	TP27.5317x26.4998x0.7925	22.93	0.336	18.264	0.037	0.32	0.004	18.264	0.000
L10	86.5 - 85.75 (10)	TP27.6724x27.5317x1.1823	23.03	0.228	18.256	0.025	0.32	0.003	18.256	0.000
L11	85.75 - 68.0833 (11)	TP30.9868x27.6724x0.7796	25.35	0.334	19.268	0.035	0.32	0.003	19.268	0.000
L12	68.0833 - 66.75 (12)	TP31.237x30.9868x0.8295	25.52	0.314	21.092	0.030	0.32	0.003	21.092	0.000
L13	66.75 - 63.25 (13)	TP31.8936x31.237x1.0345	25.99	0.253	20.932	0.025	0.32	0.002	20.932	0.000
L14	63.25 - 62.75 (14)	TP31.9874x31.8936x1.2477	26.06	0.211	18.988	0.023	0.32	0.002	18.988	0.000
L15	62.75 - 56.25 (15)	TP33.2069x31.9874x0.8881	26.90	0.291	19.020	0.031	0.32	0.002	19.020	0.000
L16	56.25 - 44.667 (16)	TP35.38x33.2069x0.8131	27.66	0.315	21.140	0.030	0.32	0.003	21.140	0.000
L17	44.667 - 35.5 (17)	TP36.4734x32.7534x0.8462	28.54	0.315	21.184	0.030	0.32	0.002	21.184	0.000
L18	35.5 - 34.25 (18)	TP36.7078x36.4734x0.8425	29.59	0.304	21.176	0.029	0.32	0.002	21.176	0.000
L19	34.25 - 33.25 (19)	TP36.8953x36.7078x1.0917	29.70	0.236	21.196	0.023	0.32	0.002	21.196	0.000
L20	33.25 - 26.25 (20)	TP38.2079x36.8953x0.7663	30.43	0.329	21.212	0.032	0.32	0.002	21.212	0.000
L21	26.25 - 25.25 (21)	TP38.3954x38.2079x1.0944	30.55	0.232	21.212	0.022	0.32	0.002	21.212	0.000
L22	25.25 - 12.25 (22)	TP40.833x38.3954x0.8201	31.94	0.302	21.240	0.029	0.32	0.002	21.240	0.000
L23	12.25 - 9.25 (23)	TP41.3955x40.833x0.7657	32.25	0.322	22.312	0.029	0.32	0.002	22.312	0.000
L24	9.25 - 3 (24)	TP42.5675x41.3955x0.7648	32.91	0.320	22.116	0.029	0.32	0.002	22.116	0.000
L25	3 - 0 (25)	TP43.13x42.5675x0.828	33.23	0.295	20.680	0.029	0.32	0.002	20.680	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 133 (1)	0.005	0.920	0.000	0.071	0.000	0.926 ✔	1.333	H1-3+VT ✔
L2	133 - 123.5 (2)	0.007	1.005	0.000	0.069	0.001	1.014 ✔	1.333	H1-3+VT ✔
L3	123.5 - 118.75 (3)	0.005	0.683	0.000	0.039	0.000	0.688 ✔	1.333	H1-3+VT ✔
L4	118.75 - 117 (4)	0.004	0.556	0.000	0.029	0.000	0.560 ✔	1.333	H1-3+VT ✔
L5	117 - 95.167 (5)	0.007	1.076	0.000	0.043	0.000	1.084 ✔	1.333	H1-3+VT ✔
L6	95.167 - 93.75 (6)	0.007	1.006	0.000	0.037	0.000	1.013	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L7	93.75 - 92.75 (7)	0.006	0.922	0.000	0.033	0.000	0.929 ✔	1.333	H1-3+VT ✔
L8	92.75 - 92 (8)	0.005	0.774	0.000	0.027	0.000	0.780 ✔	1.333	H1-3+VT ✔
L9	92 - 86.5 (9)	0.008	1.088	0.000	0.037	0.000	1.097 ✔	1.333	H1-3+VT ✔
L10	86.5 - 85.75 (10)	0.005	0.767	0.000	0.025	0.000	0.772 ✔	1.333	H1-3+VT ✔
L11	85.75 - 68.0833 (11)	0.009	1.154	0.000	0.035	0.000	1.164 ✔	1.333	H1-3+VT ✔
L12	68.0833 - 66.75 (12)	0.008	1.001	0.000	0.030	0.000	1.009 ✔	1.333	H1-3+VT ✔
L13	66.75 - 63.25 (13)	0.007	0.836	0.000	0.025	0.000	0.843 ✔	1.333	H1-3+VT ✔
L14	63.25 - 62.75 (14)	0.006	0.781	0.000	0.023	0.000	0.787 ✔	1.333	H1-3+VT ✔
L15	62.75 - 56.25 (15)	0.009	1.079	0.000	0.031	0.000	1.089 ✔	1.333	H1-3+VT ✔
L16	56.25 - 44.667 (16)	0.009	1.071	0.000	0.030	0.000	1.081 ✔	1.333	H1-3+VT ✔
L17	44.667 - 35.5 (17)	0.010	1.124	0.000	0.030	0.000	1.135 ✔	1.333	H1-3+VT ✔
L18	35.5 - 34.25 (18)	0.011	1.106	0.000	0.029	0.000	1.118 ✔	1.333	H1-3+VT ✔
L19	34.25 - 33.25 (19)	0.009	0.872	0.000	0.023	0.000	0.881 ✔	1.333	H1-3+VT ✔
L20	33.25 - 26.25 (20)	0.012	1.219	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
L21	26.25 - 25.25 (21)	0.009	0.878	0.000	0.022	0.000	0.887 ✔	1.333	H1-3+VT ✔
L22	25.25 - 12.25 (22)	0.013	1.157	0.000	0.029	0.000	1.170 ✔	1.333	H1-3+VT ✔
L23	12.25 - 9.25 (23)	0.013	1.178	0.000	0.029	0.000	1.191 ✔	1.333	H1-3+VT ✔
L24	9.25 - 3 (24)	0.013	1.194	0.000	0.029	0.000	1.208 ✔	1.333	H1-3+VT ✔
L25	3 - 0 (25)	0.013	1.186	0.000	0.029	0.000	1.200 ✔	1.333	H1-3+VT ✔

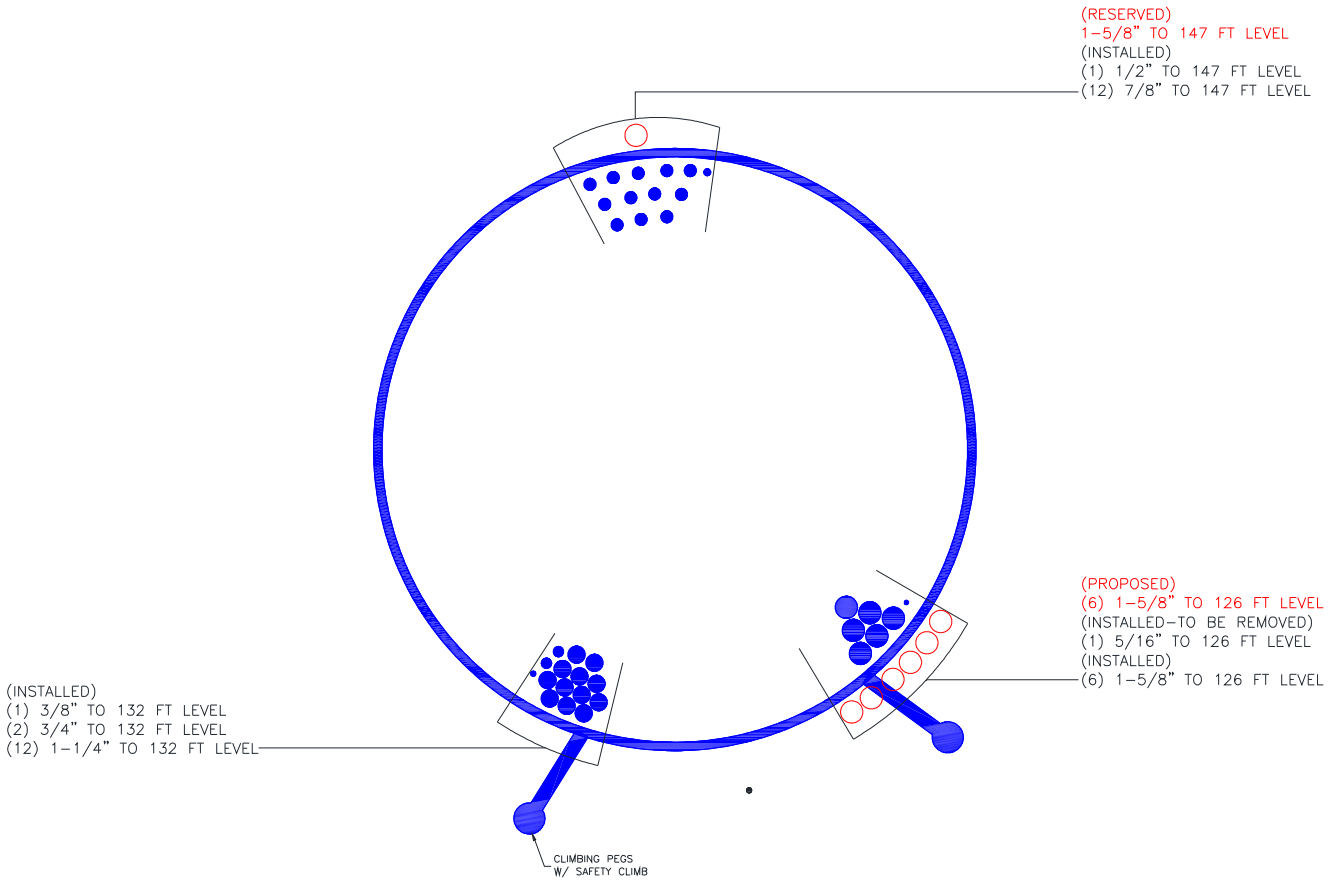
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	150 - 133	Pole	TP19.1871x16x0.1875	1	-2.27	596.34	69.5	Pass
L2	133 - 123.5	Pole	TP20.9682x19.1871x0.422	2	-5.87	1059.49	76.1	Pass
L3	123.5 - 118.75	Pole	TP21.8587x20.9682x0.7535	3	-6.80	1945.69	51.6	Pass
L4	118.75 - 117	Pole	TP22.1868x21.8587x1.0003	4	-7.24	2595.71	42.0	Pass
L5	117 - 95.167	Pole	TP26.28x22.1868x0.6518	5	-10.71	1992.30	81.3	Pass
L6	95.167 - 93.75	Pole	TP26.1715x24.1641x0.7755	6	-12.51	2381.70	76.0	Pass
L7	93.75 - 92.75	Pole	TP26.3591x26.1715x0.9049	7	-13.12	2704.88	69.7	Pass
L8	92.75 - 92	Pole	TP26.4998x26.3591x1.1119	8	-13.38	3313.69	58.5	Pass
L9	92 - 86.5	Pole	TP27.5317x26.4998x0.7925	9	-14.82	2491.96	82.3	Pass
L10	86.5 - 85.75	Pole	TP27.6724x27.5317x1.1823	10	-15.10	3681.12	57.9	Pass
L11	85.75 - 68.0833	Pole	TP30.9868x27.6724x0.7796	11	-20.08	2921.26	87.3	Pass
L12	68.0833 - 66.75	Pole	TP31.237x30.9868x0.8295	12	-20.50	3425.29	75.7	Pass
L13	66.75 - 63.25	Pole	TP31.8936x31.237x1.0345	13	-21.84	4302.11	63.2	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L14	63.25 - 62.75	Pole	TP31.9874x31.8936x1.2477	14	-22.07	4688.77	59.1	Pass
L15	62.75 - 56.25	Pole	TP33.2069x31.9874x0.8881	15	-24.32	3514.99	81.7	Pass
L16	56.25 - 44.667	Pole	TP35.38x33.2069x0.8131	16	-26.41	3714.54	81.1	Pass
L17	44.667 - 35.5	Pole	TP36.4734x32.7534x0.8462	17	-29.84	3840.23	85.1	Pass
L18	35.5 - 34.25	Pole	TP36.7078x36.4734x0.8425	18	-33.61	4119.70	83.8	Pass
L19	34.25 - 33.25	Pole	TP36.8953x36.7078x1.0917	19	-34.08	5333.87	66.1	Pass
L20	33.25 - 26.25	Pole	TP38.2079x36.8953x0.7663	20	-36.57	3918.53	92.4	Pass
L21	26.25 - 25.25	Pole	TP38.3954x38.2079x1.0944	21	-37.06	5574.94	66.5	Pass
L22	25.25 - 12.25	Pole	TP40.833x38.3954x0.8201	22	-42.19	4487.38	87.8	Pass
L23	12.25 - 9.25	Pole	TP41.3955x40.833x0.7657	23	-43.35	4469.04	89.3	Pass
L24	9.25 - 3	Pole	TP42.5675x41.3955x0.7648	24	-45.81	4552.11	90.6	Pass
L25	3 - 0	Pole	TP43.13x42.5675x0.828	25	-47.10	4663.30	90.0	Pass
							Summary	
						Pole (L20)	92.4	Pass
						RATING =	**92.4**	**Pass**

APPENDIX B

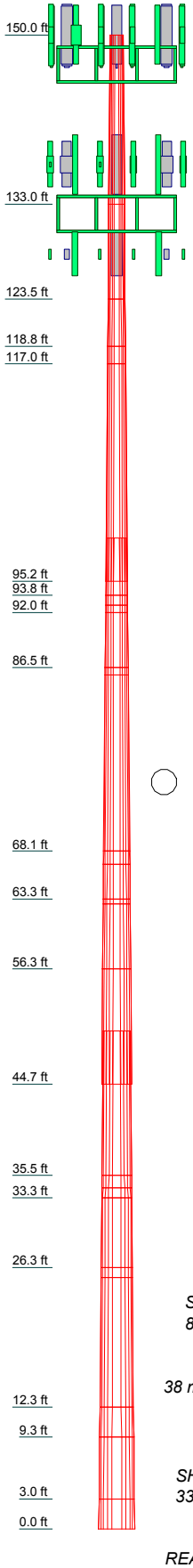
BASE LEVEL DRAWING

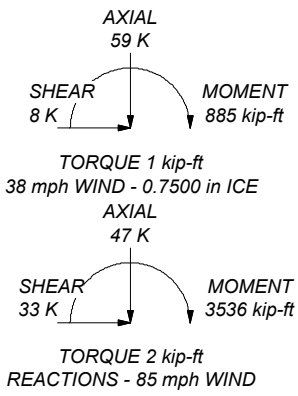


APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Length (ft)	17.0000	9.5000	7.7500	1.7500	21.8330	5.7500	5.7500	5.7500	5.7500	0.7500	17.6667	5.7500	5.7500	5.7500	6.5000	11.5830	14.5000	1.0000	7.0000	1.0000	1.0000	13.0000	3.0000	6.2500	3.0000
Number of Sides	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Thickness (in)	0.1875	0.4220	0.7535	1.0000	0.6518	1.1820	1.1820	1.1820	1.1820	1.1820	0.7795	1.1820	1.1820	1.1820	0.8881	0.8131	0.8461	1.0425	1.0425	1.0425	1.0944	0.8201	0.7657	0.7648	0.8279
Socket Length (ft)					4.3330											5.3330									
Top Dia (in)	16.0000	19.1871	19.9682	21.8587	22.1868	27.5326	27.5326	27.5326	27.5326	27.5326	27.6724	27.5326	27.5326	27.5326	31.9824	33.2069	32.7534	36.4734	36.4734	36.4734	36.8953	38.3954	41.8330	41.3955	42.5675
Bot Dia (in)	19.1871	20.9682	21.8587	22.1868	26.2800	27.6724	27.6724	27.6724	27.6724	27.6724	30.9868	27.6724	27.6724	27.6724	33.2069	35.3800	36.4734	40.1934	40.1934	40.1934	40.5953	40.8330	41.3955	41.5675	43.1300
Grade	A572-65	Reinf 47.45 ksi	Reinf 47.47 ksi	Reinf 47.56 ksi	Reinf 47.83 ksi	Reinf 47.89 ksi	Reinf 47.89 ksi	Reinf 47.89 ksi	Reinf 47.89 ksi	Reinf 47.89 ksi	Reinf 48.17 ksi	Reinf 47.89 ksi	Reinf 47.89 ksi	Reinf 47.89 ksi	Reinf 47.55 ksi	Reinf 52.85 ksi	Reinf 52.96 ksi	Reinf 52.94 ksi	Reinf 52.94 ksi	Reinf 52.94 ksi	Reinf 53.03 ksi	Reinf 53.10 ksi	Reinf 53.10 ksi	Reinf 55.78 ksi	Reinf 56.03 ksi
Weight (K)	0.6	0.9	0.8	0.4	3.7	0.2	0.2	0.2	0.2	0.3	4.3	0.3	0.2	0.2	2.0	3.5	4.5	0.4	0.4	0.4	0.4	4.5	1.0	2.2	1.1





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) HBXX-6517DS-A2M w/ Mount Pipe	147	AM-X-CD-16-65-00T-RET w/ Mount Pipe	132
(2) HBXX-6517DS-A2M w/ Mount Pipe	147	(2) LGP21401	132
(2) HBXX-6517DS-A2M w/ Mount Pipe	147	(2) LGP21401	132
(2) RRH2x60-AWS	147	(2) LGP21401	132
(2) RRH2x60-AWS	147	(2) RRUS-11	132
(2) RRH2x60-AWS	147	(2) RRUS-11	132
DB-T1-6Z-8AB-0Z	147	(2) RRUS-11	132
BXA-70063-6CF-2 w/ Mount Pipe	147	DC6-48-60-18-8F	132
BXA-70063-6CF-2 w/ Mount Pipe	147	(2) LGP21903	132
BXA-70063-6CF-2 w/ Mount Pipe	147	(2) LGP21903	132
(2) LPA-80063/6CFx5 w/ Mount Pipe	147	(2) LGP21903	132
(2) LPA-80063/6CFx5 w/ Mount Pipe	147	Platform Mount [LP 713-1]	132
(2) LPA-80063/6CFx5 w/ Mount Pipe	147	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	126
(2) FD9R6004/2C-3L	147	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	126
(2) FD9R6004/2C-3L	147	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	126
(2) FD9R6004/2C-3L	147	(2) KRY 112 71	126
KS24019-L112A	147	(2) KRY 112 71	126
Platform Mount [LP 713-1]	147	(2) KRY 112 71	126
(2) 7770.00 w/ Mount Pipe	132	Side Arm Mount [SO 101-3]	126
(2) 7770.00 w/ Mount Pipe	132		
(2) 7770.00 w/ Mount Pipe	132		
AM-X-CD-16-65-00T-RET w/ Mount Pipe	132		
AM-X-CD-16-65-00T-RET w/ Mount Pipe	132		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	Reinf 52.33 ksi	52 ksi	66 ksi
Reinf 47.45 ksi	47 ksi	60 ksi	Reinf 47.47 ksi	47 ksi	60 ksi
Reinf 47.51 ksi	48 ksi	60 ksi	Reinf 47.55 ksi	48 ksi	60 ksi
Reinf 47.56 ksi	48 ksi	60 ksi	Reinf 52.85 ksi	53 ksi	67 ksi
Reinf 47.83 ksi	48 ksi	60 ksi	Reinf 52.96 ksi	53 ksi	67 ksi
Reinf 47.89 ksi	48 ksi	60 ksi	Reinf 52.94 ksi	53 ksi	67 ksi
Reinf 45.60 ksi	46 ksi	57 ksi	Reinf 52.99 ksi	53 ksi	67 ksi
Reinf 45.58 ksi	46 ksi	57 ksi	Reinf 53.03 ksi	53 ksi	67 ksi
Reinf 45.66 ksi	46 ksi	58 ksi	Reinf 53.10 ksi	53 ksi	67 ksi
Reinf 45.64 ksi	46 ksi	58 ksi	Reinf 55.78 ksi	56 ksi	70 ksi
Reinf 48.17 ksi	48 ksi	61 ksi	Reinf 55.29 ksi	55 ksi	70 ksi
Reinf 52.73 ksi	53 ksi	66 ksi	Reinf 51.70 ksi	52 ksi	65 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 92.4%

Paul J Ford and Company
250 E. Broad Street Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job:	150' MP; Guilford, CT, NHV 102 943121		
Project:	PJF 37515-0830.004.7700 (BU 806361)		
Client: Crown Castle	Drawn by: Kyle Thorpe	App'd:	
Code: TIA/EIA-222-F	Date: 05/28/15	Scale: NTS	
Path:		Dwg No. E-1	

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.0 - Effective 1-12-12

Date: 5/28/2015
PJF Project: 37515-0830.004.7700
Client Ref. # 806361
Site Name: NHV 102
Description: 150' Pole
Owner: CCI
Engineer: KAT

Asymmetric Anchor Rod Analysis

Moment =	3536	k-ft	TIA Ref.	F		Location =	Base Plate	
Axial =	47.0	kips	ASIF =	1.3333		η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	33.0	kips	Max Ratio =	105.0%		Threads =	N/A	for FP, Rev. G
Anchor Qty =	18							

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

Item	Nominal Anchor Dia, in	Anchor 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	2.250	#18J A615 Gr 75	75	100	0.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
2	2.250	#18J A615 Gr 75	75	100	30.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
3	2.250	#18J A615 Gr 75	75	100	60.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
4	2.250	#18J A615 Gr 75	75	100	90.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
5	2.250	#18J A615 Gr 75	75	100	120.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
6	2.250	#18J A615 Gr 75	75	100	150.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
7	2.250	#18J A615 Gr 75	75	100	180.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
8	2.250	#18J A615 Gr 75	75	100	210.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
9	2.250	#18J A615 Gr 75	75	100	240.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
10	2.250	#18J A615 Gr 75	75	100	270.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
11	2.250	#18J A615 Gr 75	75	100	300.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
12	2.250	#18J A615 Gr 75	75	100	330.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
13	2.250	#18J A615 Gr 75	75	100	15.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
14	2.250	#18J A615 Gr 75	75	100	75.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
15	2.250	#18J A615 Gr 75	75	100	135.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
16	2.250	#18J A615 Gr 75	75	100	195.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
17	2.250	#18J A615 Gr 75	75	100	255.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
18	2.250	#18J A615 Gr 75	75	100	315.0	50.62	0.00	3.98	188.89	183.67	183.67	0.00	195.00	94.2%
								71.64						

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v1.0 - Effective 4-26-11

Date: 5/28/2015
PJF Project: 37515-0830.004.7700
Client Ref. # 9/27/4107
Site Name: NHV 102
Description: s
Owner: CCI
Engineer: KAT

Unstiffened Circular Base Plate Analysis and Anchor Load Calculation

Pole Dia =	43.130	in	Moment =	3536	k-ft	Yield Line =	26.499	in
BP Dia =	55.100	in	Axial =	47.0	kips	Above YL =	3	
BP Thk =	2.750	in	TIA Ref.	F		fb =	52.69	ksi
BP Fy =	60	ksi	ASIF =	1.3333		Fb =	60.00	ksi
Max Ratio =	105.0%		Yield Line 1 =	40.601	in	BP Ratio =	87.81%	<= 105.0%, OK
Anchor Qty =	18		Yield Line 2 =	26.499	in			

Item	Nominal Dia, in	Location, degrees	Bolt Circle, in	Area, in^2	Moment, ft-kips	Axial, kips	Net Comp, kips	Moment Arm, in	Plate Bending, k-in
1	2.250	0.0	50.62	3.98	3536	2.61	-129.11	0.00	0.00
2	2.250	30.0	50.62	3.98	3536	2.61	-45.60	0.00	0.00
3	2.250	60.0	50.62	3.98	3536	2.61	50.82	0.00	0.00
4	2.250	90.0	50.62	3.98	3536	2.61	134.33	0.00	0.00
5	2.250	120.0	50.62	3.98	3536	2.61	182.54	2.88	526.19
6	2.250	150.0	50.62	3.98	3536	2.61	182.54	2.88	526.19
7	2.250	180.0	50.62	3.98	3536	2.61	134.33	0.00	0.00
8	2.250	210.0	50.62	3.98	3536	2.61	50.82	0.00	0.00
9	2.250	240.0	50.62	3.98	3536	2.61	-45.60	0.00	0.00
10	2.250	270.0	50.62	3.98	3536	2.61	-129.11	0.00	0.00
11	2.250	300.0	50.62	3.98	3536	2.61	-177.32	0.00	0.00
12	2.250	330.0	50.62	3.98	3536	2.61	-177.32	0.00	0.00
13	2.250	15.0	50.62	3.98	3536	2.61	-90.53	0.00	0.00
14	2.250	75.0	50.62	3.98	3536	2.61	95.75	0.00	0.00
15	2.250	135.0	50.62	3.98	3536	2.61	188.89	3.75	707.39
16	2.250	195.0	50.62	3.98	3536	2.61	95.75	0.00	0.00
17	2.250	255.0	50.62	3.98	3536	2.61	-90.53	0.00	0.00
18	2.250	315.0	50.62	3.98	3536	2.61	-183.67	0.00	0.00
				71.64		47.00			1759.76

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

Job Number: 37515-0830.004.7700
Site Number: 806361
Site Name: NHV 102 943127

By: KAT
Date: 5/28/2015

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA/EIA-222-F

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	3536.0		k-ft
Shear, V =	33.0		kips
Axial Load, P =	47.0		kips
OTM =	3552.5	0.0	k-ft @ Ground

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole DP
ACI Code =	ACI 318-02
Seismic Design Category =	C
Reference Standard =	TIA/EIA-222-F
Use 1.3 Load Factor?	Yes
Load Factor =	1.30

Drilled Pier Parameters

Diameter =	6 ft
Height Above Grade =	0.5 ft
Depth Below Grade =	33 ft
fc' =	3 ksi
εc =	0.003 in/in
Mat Ftdn. Cap Width =	ft
Mat Ftdn. Cap Length =	ft
Depth Below Grade =	ft

	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	

Load Combinations Checked per TIA/EIA-222-F

1. Ult. Skin Friction/2.00 + Ult. End Bearing/2.00
+ Effective Soil Wt. - Buoyant Conc. Wt. ≥ Comp.
2. Ult. Skin Friction/2.00 + Buoyant Conc. Wt./1.25 ≥ Uplift
3. Ult. Skin Friction/1.50 + Buoyant Conc. Wt./1.50 ≥ Uplift

Steel Parameters

Number of Bars =	32
Rebar Size =	#11
Rebar Fy =	60 ksi
Rebar MOE =	29000 ksi
Tie Size =	#4
Side Clear Cover to Ties =	4 in

Soil Parameters

Water Table Depth =	10.00 ft
Depth to Ignore Soil =	3.00 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 =	110.0%
Maximum Steel Ratio =	105.0%

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	34	135	0	38	Sand	40000	800	800	34
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	22.92	ft, from Grade	Shear, V =	33.00	kips
Bending Moment, M =	4308.81	k-ft, from COR	Resisting Shear, Va =	109.18	kips
Resisting Moment, Ma =	14255.39	k-ft, from COR			
MOMENT RATIO =	**30.2%**	**OK**	**SHEAR RATIO =**	**30.2%**	**OK**

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	307.39	kips
UPLIFT RATIO =	**0.0%**	**OK**

Soil Results: Compression

Compression, C =	47.00	kips
Allowable Comp. Cap., Ca =	775.56	kips
COMPRESSION RATIO =	**6.1%**	**OK**

Steel Results (ACI 318-02):

Minimum Steel Area =	13.57	sq in	Axial Load, P =	58.83	kips @ 7.25 ft Below Grade
Actual Steel Area =	49.92	sq in	Moment, M =	3730.17	k-ft @ 7.25 ft Below Grade
			Allowable Moment, Ma =	4730.67	k-ft
Allowable Min Axial, Pa =	-2073.60	kips, Where Ma = 0 k-ft	**MOMENT RATIO =**	**78.9%**	**OK**
Allowable Max Axial, Pa =	5300.10	kips, Where Ma = 0 k-ft			

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#: *806361*
Site Name: *NHV 102 943127*
App #:

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:

Pier Diameter =	6.0	ft
Concrete Area =	4071.5	in^2

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	5.13	ft
Vert. Cage Diameter =	61.59	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	32	
As Total=	49.92	in^2
A s/ Aconc, Rho:	0.0123	1.23%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:
(3)*(Sqrt(f'c)/Fy: 0.0027
200 / Fy: 0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	1.23%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	6890.12	kips
at Mu=(ϕ=0.65)Mn=	3484.22	ft-kips
Max Tu, (φ=0.9) Tn =	2695.68	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	3730.17	ft-kips **(* Note)**
Max. Service Shaft P:	58.83	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		
1.30	Mu:	4849.221	ft-kips
1.30	Pu:	76.479	kips

Material Properties

Concrete Comp. strength, f'c =	3000	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= 2002

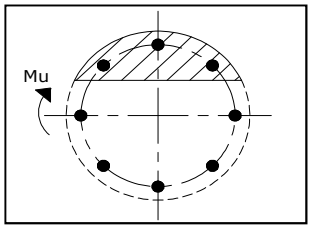
Seismic Properties

Seismic Design Category =	C
Seismic Risk =	**Moderate**

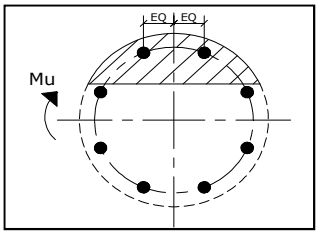
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **2**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**16.91**	in
Extreme Steel Strain, ϵt:	**0.0088**	
	ϵt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	76.48	kips
Drilled Shaft Moment Capacity, φMn:	**6149.87**	ft-kips
Drilled Shaft Superimposed Mu:	**4849.22**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**78.9%**

37515-0830.004.DWG

MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

BU NUMBER; SITE NAME

BU #806361; NHV 102 943127

APP: 286090 REV. 0; WO: 1066814

SITE ADDRESS

131 MANOR RD
GUILFORD, CONNECTICUT 06437
NEW HAVEN COUNTY

PROJECT NOTES

1. THESE DRAWINGS WERE PREPARED FROM INFORMATION AND DOCUMENTS 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. DETAILED FIELD INFORMATION REGARDING INTERFERENCES AND/OR EXISTING FIELD CONDITIONS MAY BE AVAILABLE ON CROWN CASTLE'S CCISITES AND FROM CONTRACTOR'S PRE-MOD MAPPING. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AND COORDINATE WITH THE AVAILABLE SOURCES OF INFORMATION ABOVE AND WITH THE PROJECT DRAWINGS BEFORE PROCEEDING WITH THE WORK. CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO THE EOR AND CROWN CASTLE FIELD PERSONNEL BEFORE PROCEEDING WITH THE WORK.

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

3. 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.

4. DTI'S REQUIRED: ALL ONE SIDED BOLTS SHALL BE INSTALLED USING DIRECT TENSION INDICATORS (DTI'S) AND HARDENED WASHERS. ALL ONE SIDED BOLTS SHALL BE PRETENSIONED AND TIGHTENED UNTIL THE DTI WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED. SEE NOTES AND DETAILS ON SHEET S-2 FOR REQUIREMENTS ON THE USE OF DTI WASHERS WITH THE BOLTS.

PROJECT CONTACT:

MONOPOLE OWNER:
CROWN CASTLE
MOD PM: TRICIA PELON AT TRICIA.PELON@CROWNCASTLE.COM
PH: (518) 373-3507
MOD CM: JASON D'AMICO AT JASON.D'AMICO.VENDOR@CROWNCASTLE.COM
PH: (860) 209-0104

DESIGN STANDARD

THE STRUCTURAL ANALYSIS WAS PERFORMED FOR THIS TOWER IN ACCORDANCE WITH THE REQUIREMENTS OF TIA/EIA-222-F STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES AND THE 2005 CONNECTICUT BUILDING CODE WITH 2009 AMENDMENT USING A FASTEST MILE WIND SPEED OF 85 MPH WITH NO ICE, 37.6 MPH WITH 3/4 INCH ICE THICKNESS AND 50 MPH UNDER SERVICE LOADS.
REFER TO THE POLE DESIGN AND ANTENNA LOADING DOCUMENTED IN THE PJF STRUCTURAL ANALYSIS FOR THIS SITE (PJF#37515-0830.004.7700), DATED 05/28/2015.

THIS PROJECT INCLUDES THE FOLLOWING ITEMS:

SHAFT REINFORCING
FIELD WELDED STIFFENERS
REMOVAL OF EXISTING BASE PLATE STIFFENERS

SHEET INDEX

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

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

BU #806361; NHV 102 943127
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700

DRAWN BY: CAW	TITLE SHEET
CHECKED BY: KAT	
APPROVED BY:	T-1
DATE: 05/28/2015	

37515-0830.004.DWG

CROWN CASTLE PROJECT: BU #806361; NHV 102 943127; GUILFORD, CONNECTICUT
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 ANTENNA AND PLATFORM LOADS SHOWN ON THESE DRAWINGS AT THE REQUIRED MINIMUM WIND SPEEDS. DO NOT INSTALL ANY ADDITIONAL OR NEW ANTENNA AND PLATFORM LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.

1.2. 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.

1.3. 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.

1.4. THE STRUCTURAL CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY CROWN CASTLE AND/OR THE EOR SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES.

1.5. ANY SUPPORT SERVICES PERFORMED BY THE EOR DURING CONSTRUCTION ARE SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING GENERAL CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.

1.6. 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.

1.7. 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.

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

1.9. 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.

1.10. 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.

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" (PARAGRAPH 4.2.1 SPECIFICALLY EXCLUDED).

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. 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.

2.3. 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.

2.4. 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.

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

2.6. 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.

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

2.8. FIELD CUTTING OF STEEL:

2.8.1. IMPORTANT CUTTING AND WELDING SAFTEY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFTEY 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.

2.8.2. 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.

8.3. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES WITH EOR APPROVAL OF LOCATIONS.

8.4. 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 SEVER WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

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

BU #806361; NHV 102 943127
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700

DRAWN BY: CAW	GENERAL NOTES
CHECKED BY: KAT	
APPROVED BY:	S-1
DATE: 05/28/2015	

37515-0830.004.DWG

AJAX BOLT NOTE SHEET: REV. 1.5, 5-12-2014

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.

3. ALL AJAX M20 BOLTS WITH SHEAR SLEEVES SHALL BE PRETENSIONED AND TIGHTENED UNTIL THE DIRECT TENSION INDICATOR (DTI) WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED. SEE NOTES AND DETAIL BELOW FOR THE USE OF DIRECT TENSION INDICATOR (DTI) WASHERS WITH THE AJAX M20 BOLTS.

4. ALL AJAX BOLTS SHALL BE INSTALLED USING DIRECT TENSION INDICATORS (DTI'S) AND HARDENED WASHERS. DTI'S SHALL BE THE SQUIRTER® STYLE, MADE TO ASTM F959 LATEST REVISION; AND HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A HARDNESS OF RC 38 OR HIGHER.

NOTES FOR AJAX M20 'ONE-SIDE BOLTS WITH DIRECT TENSION INDICATORS (DTI'S):

DTI'S REQUIRED: DTI'S SHALL BE "SELF-INDICATING" SQUIRTER® STYLE DTI'S MADE WITH RED DURABLE SQUIRT MEDIA EMBEDDED IN THEM, INSPECTED BY MEANS OF THE VISUAL EJECTION OF SILICONE AS THE DTI PROTRUSIONS COMPRESS. SQUIRTER® DTI'S SHALL BE CALIBRATED PER MANUFACTURER'S INSTRUCTIONS PRIOR TO USE.

THE DIRECT TENSION INDICATOR (DTI) WASHERS SHALL BE THE "SQUIRTER® STYLE" AS MANUFACTURED BY APPLIED BOLTING TECHNOLOGY PRODUCTS' INC.:

PART NUMBER: 2DTIM208MGAFSIF

DESCRIPTION: P.C. 8.8 DTI SQUIRTER WASHER WITH RED DURABLE SQUIRT MEDIA DESIGNED SPECIFICALLY FOR THE AJAX M20 ONESIDE BOLT. FINISH SHALL BE ZINC GALVANIZED AS PROVIDED BY THE DTI MANUFACTURER.

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

DTI: USE DIRECT TENSION INDICATOR (DTI) WASHERS COMPATIBLE WITH 20 MM (M20) NOMINAL A325 BOLTS FOR THE AJAX M20 BOLTS. DTI'S SHALL NOT BE HOT-DIP GALVANIZED. DTI'S SHALL BE MECHANICALLY GALVANIZED (MG) BY THE COLD MECHANICAL PROCESS ONLY AS PROVIDED BY THE DTI MANUFACTURER.

HARDENED WASHERS REQUIRED: USE A HARDENED WASHER FOR A 20 MM (M20) NOMINAL BOLT BETWEEN THE TOP OF THE DIRECT TENSION INDICATOR (DTI) WASHER AND THE NUT OF THE AJAX M20 BOLTS. HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A MINIMUM HARDNESS OF RC 38 OR HIGHER. THE HARDENED WASHERS SHALL BE MECHANICALLY GALVANIZED BY THE COLD MECHANICAL PROCESS. ALTERNATIVELY, CORRECTLY MADE HOT DIP GALVANIZED HARDENED FLAT WASHERS HAVING A MINIMUM HARDNESS OF RC 38 CAN BE USED; CONTRACTOR SHALL PROVIDE DOCUMENTATION OF WASHER SPECIFICATION AND HARDNESS.

NUT LUBRICATION REQUIRED: PROPERLY LUBRICATE THE THREADS OF THE NUT OF THE AJAX BOLT SO THAT IT CAN BE PROPERLY TIGHTENED WITHOUT GALLING AND/OR LOCKING UP ON THE BOLT THREADS. CONTRACTOR SHALL FOLLOW DTI MANUFACTURER INSTRUCTIONS FOR PROPER LUBRICATION AND TIGHTENING.

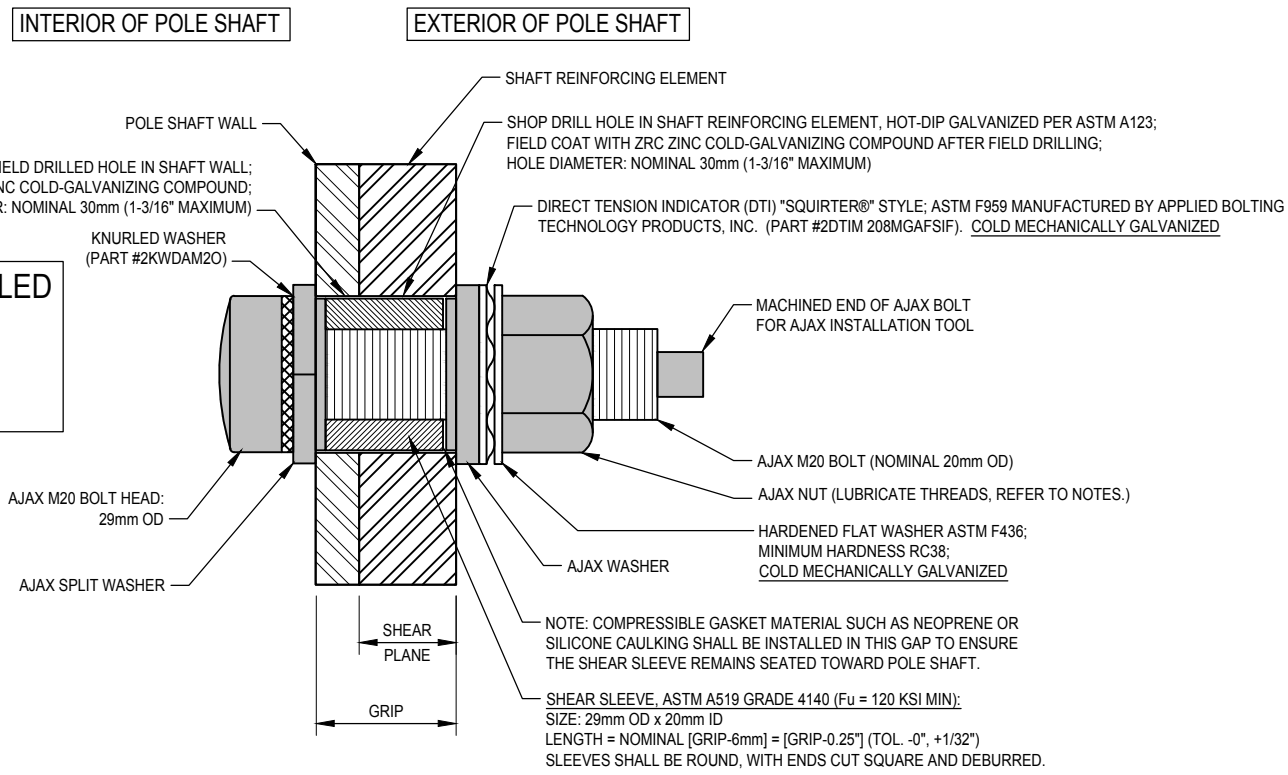
NOTE: COMPLETELY COMPRESSED DTI'S SHOWING NO VISIBLE REMAINING GAP ARE ACCEPTABLE. DTI WASHERS SHALL BE PLACED DIRECTLY AGAINST THE OUTER AJAX WASHER WITH THE DTI BUMPS FACING AWAY FROM THE AJAX WASHER. PLACE A HARDENED WASHER BETWEEN THE DTI AND THE AJAX NUT. THE DTI BUMPS SHALL BEAR AGAINST THE UNDERSIDE OF A HARDENED FLAT WASHER, NEVER DIRECTLY AGAINST THE NUT.

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

INSPECTION REQUIRED: ALL AJAX BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009, BY A QUALIFIED BOLT INSPECTOR. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE AJAX BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. IN ADDITION, ALL AJAX BOLTS AND DTI'S SHALL BE VISUALLY INSPECTED ACCORDING TO THE DTI MANUFACTURER'S INSTRUCTIONS. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE PHOTO DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THE CONDITION OF THE DTI'S.

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

NOTE: ALL AJAX BOLTS, AJAX SPLIT WASHERS, AJAX WASHERS, AJAX NUTS, AND SHEAR SLEEVES SHALL BE HOT DIP GALVANIZED PER ASTM A123 OR A153 AS APPROPRIATE. SHEAR SLEEVES MAY BE COLD GALVANIZED OR ZINC PLATED.



TYPICAL AJAX BOLT DETAIL 1/S-2

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

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

BU #806361; NHV 102 943127
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700

DRAWN BY: CAW	AJAX BOLT DETAIL
CHECKED BY: KAT	
APPROVED BY:	S-2
DATE: 05/28/2015	

37515-0830.004.DWG

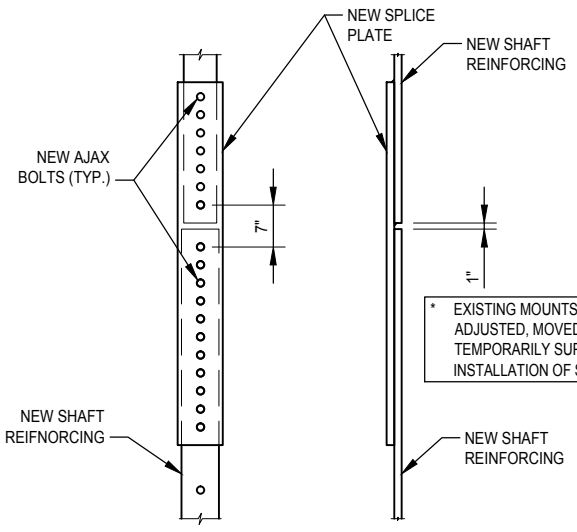
POLE SPECIFICATIONS	
POLE SHAPE TYPE:	12-SIDED POLYGON
TAPER:	0.187510 IN/FT
SHAFT STEEL:	Fy=65 KSI
BASE PL STEEL:	Fy=60 KSI
ANCHOR RODS:	2 1/4"ø #18J ASTM A615 GRADE 75

SHAFT SECTION DATA					
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN) @ TOP	DIAMETER ACROSS FLATS (IN) @ BOTTOM
1	54.83	0.1875	51.96	16.000	26.280
2	54.83	0.3125	63.96	25.092	35.380
3	50.00	0.3750		33.754	43.130
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES					

CONTRACTOR SHALL PROVIDE ASTM A36 SHIM PLATES BELOW SLIP JOINTS. THE SHIM PLATES SHALL BE PLACED BETWEEN THE NEW SHAFT REINFORCEMENT AND THE EXISTING POLE SHAFT FROM THE SLIP JOINT TO THE NEW SHAFT REINFORCEMENT SPLICE PLATE LOCATION AND A EXTRA LONG "SPLICE SHIM" SHALL BE PLACED BETWEEN THE NEW UPPER AND LOWER SHAFT REINFORCEMENT PLATES AT THE SHAFT REINFORCEMENT SPLICE PLATE LOCATION AND ALL TERMINATION POINTS, AS REQUIRED.

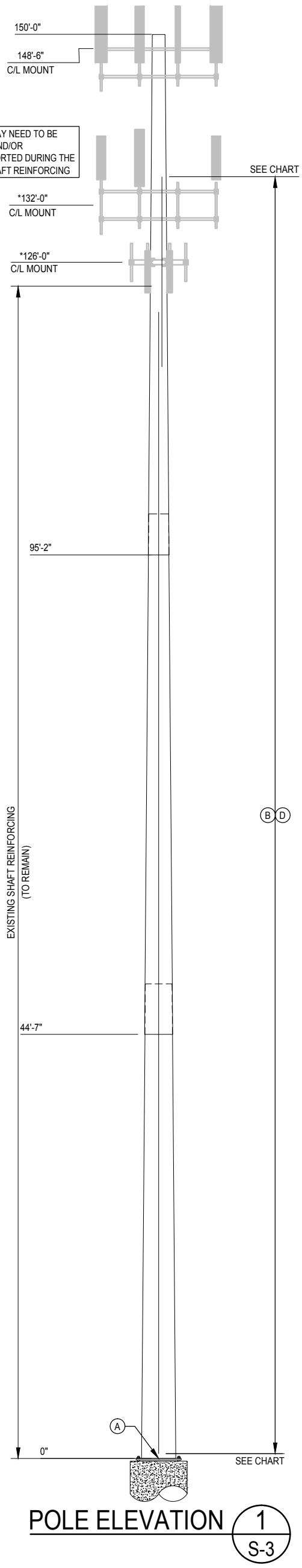
MODIFICATIONS:

- (A) INSTALL NEW TRANSITION STIFFENERS AT BASE PLATE. SEE SHEET S-4.
- (B) INSTALL NEW SHAFT REINFORCING. SEE CHART ON THIS SHEET.
- (C) REMOVAL OF BASE PLATE STIFFENERS. SEE SHEET S-4.
- (D) CONTRACTOR TO RELOCATE/REPLACE STEP PEGS AS NECESSARY. COORDINATE WITH CROWN CASTLE.



DETAIL 2 / S-3
SCALE: NTS

* EXISTING MOUNTS MAY NEED TO BE ADJUSTED, MOVED AND/OR TEMPORARILY SUPPORTED DURING THE INSTALLATION OF SHAFT REINFORCING



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 AJAX BOLTS PER ELEMENT	APPROXIMATE TOTAL AJAX BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
0' - 6"	35' - 6"	F9	CCI-AFP-06010035	35' - 0"	1	42	42	10	10	16"	715 LBS.
6' - 9"	35' - 6"	F5	1"x 6" (CUSTOM) #1	28' - 9"	1	37	37	10	10	16"	587 LBS.
9' - 9"	35' - 6"	F1	1"x 6" (CUSTOM) #2	25' - 9"	1	35	35	10	10	16"	526 LBS.
35' - 7"	70' - 7"	F1, F5 & F9	CCI-AFP-06010035	35' - 0"	3	42	126	10	10	16"	2144 LBS.
70' - 8"	95' - 8"	F1, F5 & F9	CCI-AFP-04510025	25' - 0"	3	28	84	8	8	20"	1148 LBS.
95' - 9"	120' - 9"	F1, F5 & F9	CCI-AFP-04510025	25' - 0"	3	28	84	8	8	20"	1148 LBS.
115' - 0"	135' - 0"	F2, F6 & F10	CCI-AFP-04510020	20' - 0"	3	25	75	8	8	20"	919 LBS.
							483				7187 LBS.

NOTES:

1.) AJAX BOLTS ARE TO BE 20mm DIAMETER WITH CORRESPONDING 29mm DIAMETER SLEEVE WITH MATCHING STEEL GRADE.
2.) 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.
3.) ALL REINFORCING SHALL BE ASTM A572 GR. 65.
4.) WELDS SHALL BE E80XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.
5.) HOLES FOR AJAX BOLTS AND SHEAR SLEEVES ARE 30mm UNLESS NOTED OTHERWISE.
6.) ALL SHIMS SHALL BE ASTM A-36.

SPLICE PLATE INSTALLATION CHART

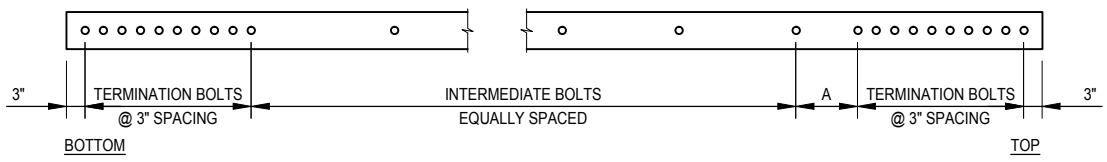
ELEVATION	FLAT PLATE THICKNESS	FLAT PLATE WIDTH	FLAT PLATE LENGTH	FLAT PLATE QUANTITY	WELD LENGTH PER SIDE	TOTAL WELD LENGTH	AJAX BOLTS PER SPLICE*	TOTAL STEEL WEIGHT
35' - 7"	1"	6"	5' - 7"	3	0"	0"	20	342 LBS.
70' - 8"	1"	4-1/2"	5' - 1"	3	0"	0"	18	311 LBS.
95' - 9"	1"	4-1/2"	4' - 7"	3	0"	0"	16	211 LBS.
						0"		864 LBS.

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

NEW SHIM CHART

1/16" SHIM QUANTITY	1/4" SHIM QUANTITY	SHIM WIDTH	SHIM LENGTH	HOLE DIAMETER
45	0	4-1/2"	4"	1-1/4"
21	3	6"	4"	1-1/4"

SHIMS ARE FOR BIDDING PURPOSES ONLY, FINAL SHIM REQUIREMENTS TO BE DETERMINED BY CONTRACTOR DURING FABRICATION.



CUSTOM BOLTED BAR DETAIL

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

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

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STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
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CROWN CASTLE
3530 TORINGDON WAY SUITE 300 CHARLOTTE, NC 28277
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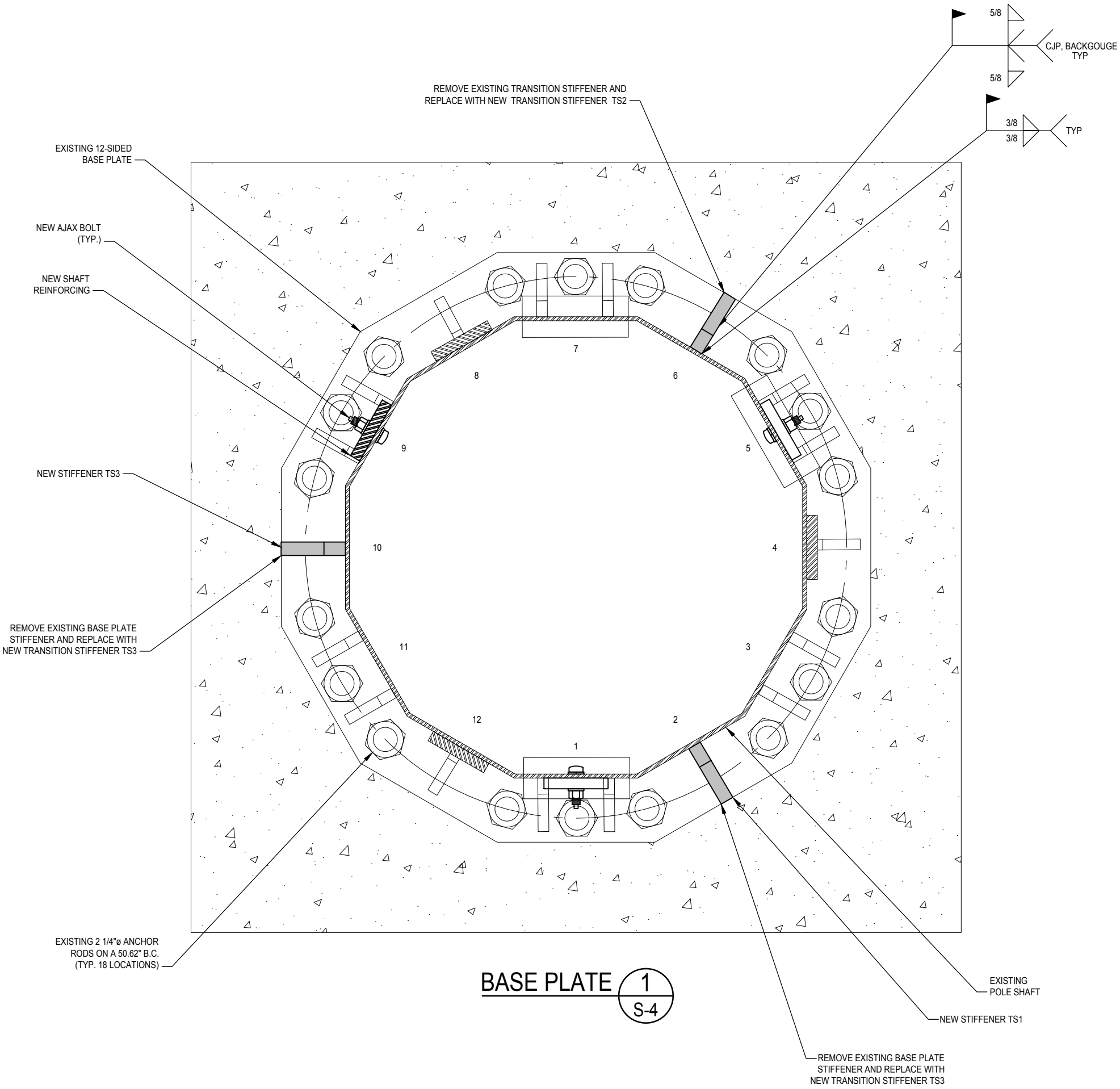
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700

DRAWN BY: CAW	MONOPOLE PROFILE
CHECKED BY: KAT	
APPROVED BY:	S-3
DATE: 05/28/2015	

37515-0830.004.DWG



BASE PLATE 1 / S-4

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STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
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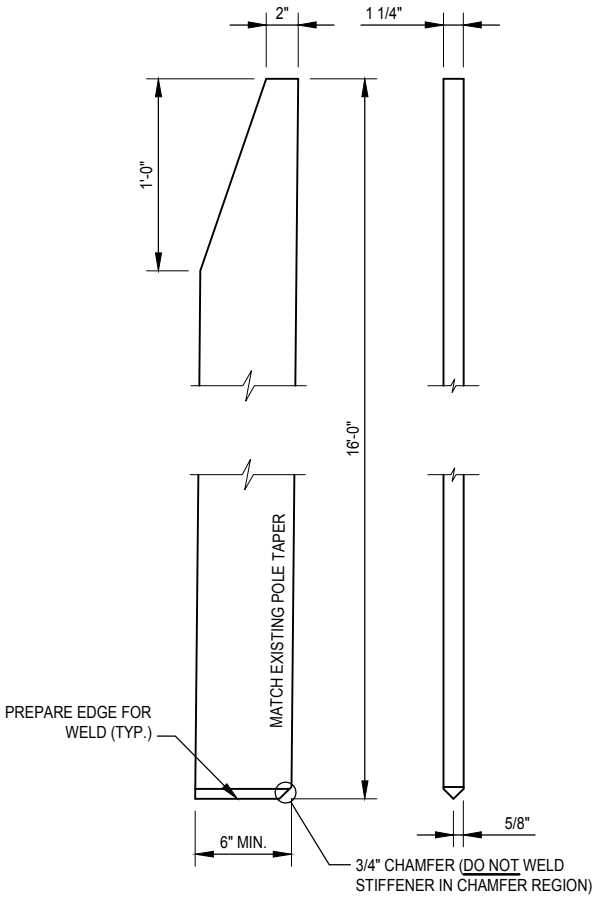
PROJECT: 37515-0830.004.7700

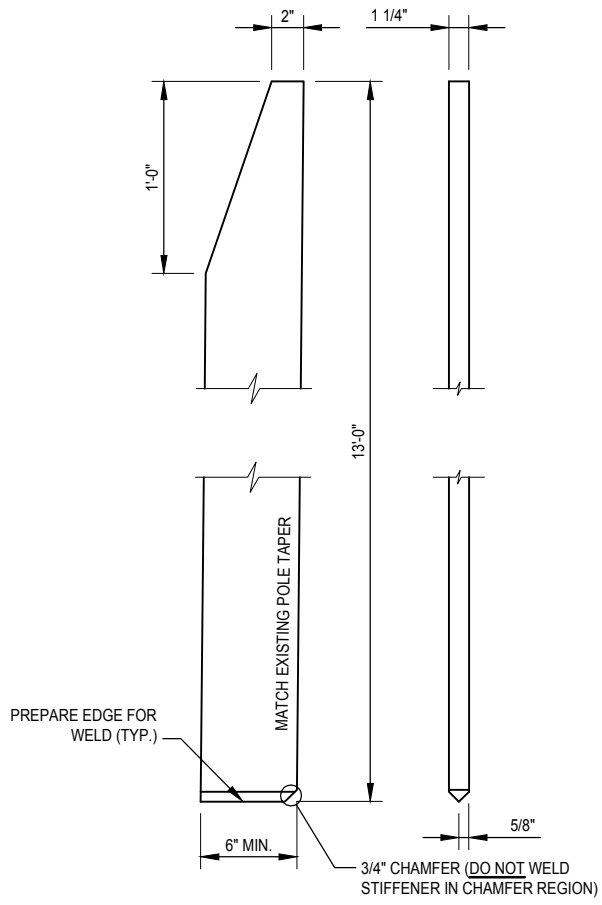
DRAWN BY: CAW	BASE PLATE DETAILS
CHECKED BY: KAT	
APPROVED BY:	S-4
DATE: 05/28/2015	

37515-0830.004.DWG



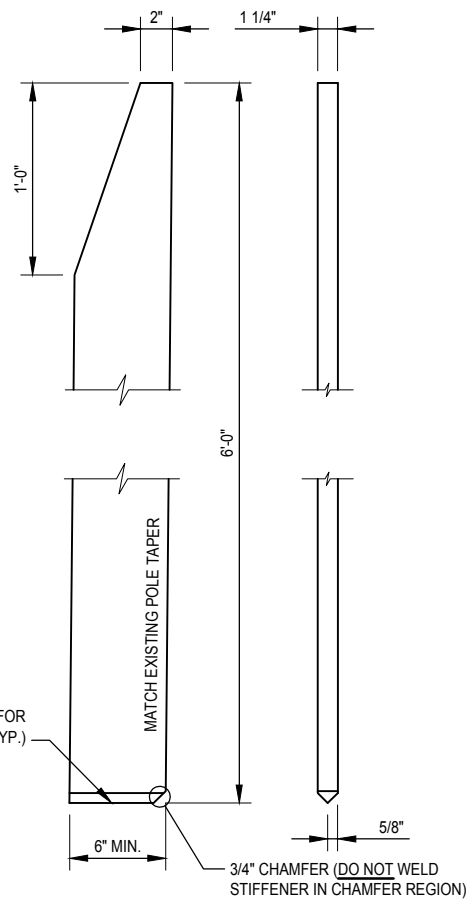
TRANSITION STIFFENER MK~TS1

(1 REQUIRED) (Fy = 65 KSI)



TRANSITION STIFFENER MK~TS2

(1 REQUIRED) (Fy = 65 KSI)



TRANSITION STIFFENER MK~TS3

(1 REQUIRED) (Fy = 65 KSI)

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

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PH: (724) 416-2000

BU #806361; NHV 102 943127
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700

DRAWN BY: CAW	MISC DETAILS
CHECKED BY: KAT	
APPROVED BY:	S-5
DATE: 05/28/2015	

37515-0830.004.DWG

MODIFICATION INSPECTION NOTES:

1. GENERAL

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

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

1.3. ALL MI'S SHALL BE CONDUCTED BY A CROWN CASTLE ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN CASTLE.

1.4. TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PO IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY. IF CONTACT INFORMATION IS NOT KNOWN, CONTACT YOUR CROWN CASTLE POINT OF CONTACT (POC).

1.5. REFER TO ENG-SOW-10007: MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

2. MI INSPECTOR

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

2.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.

2.1.2. WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.

2.1.3. THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL GC INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MI REPORT TO CROWN CASTLE.

3. GENERAL CONTRACTOR

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

3.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.

3.1.2. WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.

3.1.3. BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.

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

4. RECOMMENDATIONS

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

4.1.1. IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLE 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.

4.1.2. THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.

4.1.3. WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.

4.1.4. IT MAY BE BENEFICIAL TO INSTALL ALL TOWER MODIFICATIONS PRIOR TO CONDUCTING THE FOUNDATION INSPECTIONS TO ALLOW FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.

4.1.5. WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

5. CANCELLATION OR DELAYS IN SCHEDULED MI

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

6. CORRECTION OF FAILING MI'S

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

6.1.1. CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.

6.1.2. OR, WITH CROWN CASTLE'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.

7. MI VERIFICATION INSPECTIONS

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

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

7.3. VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT AEV/AESV FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE DATE OF AN ACCEPTED "PASSING MI" OR "PASS AS NOTED MI" REPORT FOR THE ORIGINAL PROJECT.

8. PHOTOGRAPHS

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

8.1.1. PRECONSTRUCTION GENERAL SITE CONDITION

8.1.2. PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION

8.1.3. RAW MATERIALS

8.1.4. PHOTOS OF ALL CRITICAL DETAILS

8.1.5. FOUNDATION MODIFICATIONS

8.1.6. WELD PREPARATION

8.1.7. BOLT INSTALLATION AND TORQUE

8.1.8. FINAL INSTALLED CONDITION

8.1.9. SURFACE COATING REPAIR

8.1.10. POST CONSTRUCTION PHOTOGRAPHS

8.1.11. FINAL INFIELD CONDITION

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

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

9. INSPECTION AND TESTING

9.1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY CROWN CASTLE'S REPRESENTATIVE AND CROWN CASTLE'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY.

9.2. INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS ARE STILL REQUIRED WHEN THE EOR PERFORMS SUPPORT SERVICES DURING CONSTRUCTION.

9.3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.

9.4. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED, RETAINED AND PAID FOR BY CROWN CASTLE FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.

9.4.1. ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.

9.4.2. THE INSPECTION AGENCY SHALL SO SCHEDULE THIS WORK AS TO CAUSE A MINIMUM OF INTERRUPTION TO, AND COORDINATE WITH, THE WORK IN PROGRESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE WORK SCHEDULE WITH THE TESTING AGENCY. THE CONTRACTOR SHALL ALLOW FOR ADEQUATE TIME AND ACCESS FOR THE TESTING AGENCY TO PERFORM THEIR DUTIES.

9.5. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES AND INSPECT THE FOLLOWING ITEMS IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS. THE TESTING AGENCY SHALL INSPECT ITEMS ON THIS LIST AND OTHER ITEMS AS NECESSARY TO FULFILL THEIR RESPONSIBILITY. THE TESTING AGENCY SHALL UTILIZE EXPERIENCED, TRAINED INSPECTORS INCLUDING AWS CERTIFIED WELDING INSPECTORS (CWI). INSPECTORS SHALL HAVE THE TRAINING, CREDENTIALS, AND EXPERIENCE APPROPRIATE FOR AND COMMENSURATE WITH THE SCOPE AND TYPE OF INSPECTION WORK TO BE PERFORMED.

9.6. GENERAL

9.6.1. PERFORM PERIODIC ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY CROWN CASTLE AND THE EOR IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.

9.7. FOUNDATIONS AND SOIL PREPARATION - (NOT REQUIRED)

9.8. CONCRETE TESTING PER ACI - (NOT REQUIRED)

9.9. STRUCTURAL STEEL

9.9.1. CHECK STEEL ON THE JOB WITH THE PLANS.

9.9.2. CHECK MILL CERTIFICATIONS. CALL FOR LABORATORY TEST REPORTS WHEN MILL CERTIFICATION IS IN QUESTION.

9.9.3. CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.

9.9.4. INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.

9.9.5. CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.

9.9.6. CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.

9.9.7. CHECK THAT BOLTS HAVE BEEN TIGHTENED PROPERLY.

9.9.8. 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
N/A	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
N/A	FABRICATOR NDE INSPECTION
N/A	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
	CONSTRUCTION
X	CONSTRUCTION INSPECTIONS
N/A	FOUNDATION INSPECTIONS
N/A	CONCRETE COMP. STRENGTH AND SLUMP TESTS
N/A	POST INSTALLED ANCHOR ROD VERIFICATION
N/A	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
N/A	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
N/A	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
X	INSPECTION OF ONE SIDED BOLTS AND DTI'S PER REQUIREMENTS ON SHEET S-2
N/A	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)
N/A	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
N/A	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

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

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

BU #806361; NHV 102 943127
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700

DRAWN BY: CAW
CHECKED BY: KAT
APPROVED BY:
DATE: 05/28/2015

MI CHECKLIST

S-6

37515-0830.004.DWG

MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

BU NUMBER; SITE NAME

BU #806361; NHV 102 943127

APP: 286090 REV. 0; WO: 1066814

SITE ADDRESS

131 MANOR RD
GUILFORD, CONNECTICUT 06437
NEW HAVEN COUNTY

PROJECT NOTES

1. THESE DRAWINGS WERE PREPARED FROM INFORMATION AND DOCUMENTS 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. DETAILED FIELD INFORMATION REGARDING INTERFERENCES AND/OR EXISTING FIELD CONDITIONS MAY BE AVAILABLE ON CROWN CASTLE'S CCISITES AND FROM CONTRACTOR'S PRE-MOD MAPPING. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AND COORDINATE WITH THE AVAILABLE SOURCES OF INFORMATION ABOVE AND WITH THE PROJECT DRAWINGS BEFORE PROCEEDING WITH THE WORK. CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO THE EOR AND CROWN CASTLE FIELD PERSONNEL BEFORE PROCEEDING WITH THE WORK.
2. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIRMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
3. 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.
4. DTI'S REQUIRED: ALL ONE SIDED BOLTS SHALL BE INSTALLED USING DIRECT TENSION INDICATORS (DTI'S) AND HARDENED WASHERS. ALL ONE SIDED BOLTS SHALL BE PRETENSIONED AND TIGHTENED UNTIL THE DTI WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED. SEE NOTES AND DETAILS ON SHEET S-2 FOR REQUIREMENTS ON THE USE OF DTI WASHERS WITH THE BOLTS.

PROJECT CONTACT:

MONOPOLE OWNER:
CROWN CASTLE
MOD PM: TRICIA PELON AT TRICIA.PELON@CROWNCASTLE.COM
PH: (518) 373-3507
MOD CM: JASON D'AMICO AT JASON.D'AMICO.VENDOR@CROWNCASTLE.COM
PH: (860) 209-0104

DESIGN STANDARD

THE STRUCTURAL ANALYSIS WAS PERFORMED FOR THIS TOWER IN ACCORDANCE WITH THE REQUIREMENTS OF TIA/EIA-222-F STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES AND THE 2005 CONNECTICUT BUILDING CODE WITH 2009 AMENDMENT USING A FASTEST MILE WIND SPEED OF 85 MPH WITH NO ICE, 37.6 MPH WITH 3/4 INCH ICE THICKNESS AND 50 MPH UNDER SERVICE LOADS.
REFER TO THE POLE DESIGN AND ANTENNA LOADING DOCUMENTED IN THE PJF STRUCTURAL ANALYSIS FOR THIS SITE (PJF#37515-0830.004.7700), DATED 06/08/2015.

THIS PROJECT INCLUDES THE FOLLOWING ITEMS:

SHAFT REINFORCING
FIELD WELDED STIFFENERS
REMOVAL OF EXISTING BASE PLATE STIFFENERS
PAINT MODIFICATIONS

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

6.8.15

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

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

BU #806361; NHV 102 943127
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700
DRAWN BY: C.A.W.
CHECKED BY: K.A.T.
APPROVED BY: BKW
DATE: 06/08/2015
TITLE SHEET
T-1

CROWN CASTLE PROJECT: BU #806361; NHV 102 943127; GUILFORD, CONNECTICUT
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 ANTENNA AND PLATFORM LOADS SHOWN ON THESE DRAWINGS AT THE REQUIRED MINIMUM WIND SPEEDS. DO NOT INSTALL ANY ADDITIONAL OR NEW ANTENNA AND PLATFORM LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.
   - 1.2. 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.
   - 1.3. 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.
   - 1.4. THE STRUCTURAL CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY CROWN CASTLE AND/OR THE EOR SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES.
   - 1.5. ANY SUPPORT SERVICES PERFORMED BY THE EOR DURING CONSTRUCTION ARE SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING GENERAL CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
   - 1.6. 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.
   - 1.7. 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.
   - 1.8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.
   - 1.9. 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.
   - 1.10. 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.

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" (PARAGRAPH 4.2.1 SPECIFICALLY EXCLUDED).
     - 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. 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.
   - 2.3. 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.
   - 2.4. 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.
   - 2.5. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65(FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
   - 2.6. 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.
   - 2.7. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
   - 2.8. FIELD CUTTING OF STEEL:
     - 2.8.1. IMPORTANT CUTTING AND WELDING SAFTEY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFTEY 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.
     - 2.8.2. 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.
   - 8.3. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES WITH EOR APPROVAL OF LOCATIONS.
   - 8.4. 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 SEVER WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER
6.8.15

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

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PH: (724) 416-2000

BU #806361; NHV 102 943127
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700
DRAWN BY: C.A.W.
CHECKED BY: K.A.T.
APPROVED BY: BKW
DATE: 06/08/2015
GENERAL NOTES
S-1

AJAX BOLT NOTE SHEET: REV. 1.5, 5-12-2014

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.

3. ALL AJAX M20 BOLTS WITH SHEAR SLEEVES SHALL BE PRETENSIONED AND TIGHTENED UNTIL THE DIRECT TENSION INDICATOR (DTI) WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED. SEE NOTES AND DETAIL BELOW FOR THE USE OF DIRECT TENSION INDICATOR (DTI) WASHERS WITH THE AJAX M20 BOLTS.

4. ALL AJAX BOLTS SHALL BE INSTALLED USING DIRECT TENSION INDICATORS (DTI'S) AND HARDENED WASHERS. DTI'S SHALL BE THE SQUIRTER® STYLE, MADE TO ASTM F959 LATEST REVISION; AND HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A HARDNESS OF RC 38 OR HIGHER.

NOTES FOR AJAX M20 'ONE-SIDE BOLTS WITH DIRECT TENSION INDICATORS (DTI'S):

DTI'S REQUIRED: DTI'S SHALL BE "SELF-INDICATING" SQUIRTER® STYLE DTI'S MADE WITH RED DURABLE SQUIRT MEDIA EMBEDDED IN THEM, INSPECTED BY MEANS OF THE VISUAL EJECTION OF SILICONE AS THE DTI PROTRUSIONS COMPRESS. SQUIRTER® DTI'S SHALL BE CALIBRATED PER MANUFACTURER'S INSTRUCTIONS PRIOR TO USE.

THE DIRECT TENSION INDICATOR (DTI) WASHERS SHALL BE THE "SQUIRTER® STYLE" AS MANUFACTURED BY APPLIED BOLTING TECHNOLOGY PRODUCTS' INC.:

PART NUMBER: 2DTIM208MGAFSIF

DESCRIPTION: P.C. 8.8 DTI SQUIRTER WASHER WITH RED DURABLE SQUIRT MEDIA DESIGNED SPECIFICALLY FOR THE AJAX M20 ONESIDE BOLT. FINISH SHALL BE ZINC GALVANIZED AS PROVIDED BY THE DTI MANUFACTURER.

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

DTI: USE DIRECT TENSION INDICATOR (DTI) WASHERS COMPATIBLE WITH 20 MM (M20) NOMINAL A325 BOLTS FOR THE AJAX M20 BOLTS. DTI'S SHALL NOT BE HOT-DIP GALVANIZED. DTI'S SHALL BE MECHANICALLY GALVANIZED (MG) BY THE COLD MECHANICAL PROCESS ONLY AS PROVIDED BY THE DTI MANUFACTURER.

HARDENED WASHERS REQUIRED: USE A HARDENED WASHER FOR A 20 MM (M20) NOMINAL BOLT BETWEEN THE TOP OF THE DIRECT TENSION INDICATOR (DTI) WASHER AND THE NUT OF THE AJAX M20 BOLTS. HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A MINIMUM HARDNESS OF RC 38 OR HIGHER. THE HARDENED WASHERS SHALL BE MECHANICALLY GALVANIZED BY THE COLD MECHANICAL PROCESS. ALTERNATIVELY, CORRECTLY MADE HOT DIP GALVANIZED HARDENED FLAT WASHERS HAVING A MINIMUM HARDNESS OF RC 38 CAN BE USED; CONTRACTOR SHALL PROVIDE DOCUMENTATION OF WASHER SPECIFICATION AND HARDNESS.

NUT LUBRICATION REQUIRED: PROPERLY LUBRICATE THE THREADS OF THE NUT OF THE AJAX BOLT SO THAT IT CAN BE PROPERLY TIGHTENED WITHOUT GALLING AND/OR LOCKING UP ON THE BOLT THREADS. CONTRACTOR SHALL FOLLOW DTI MANUFACTURER INSTRUCTIONS FOR PROPER LUBRICATION AND TIGHTENING.

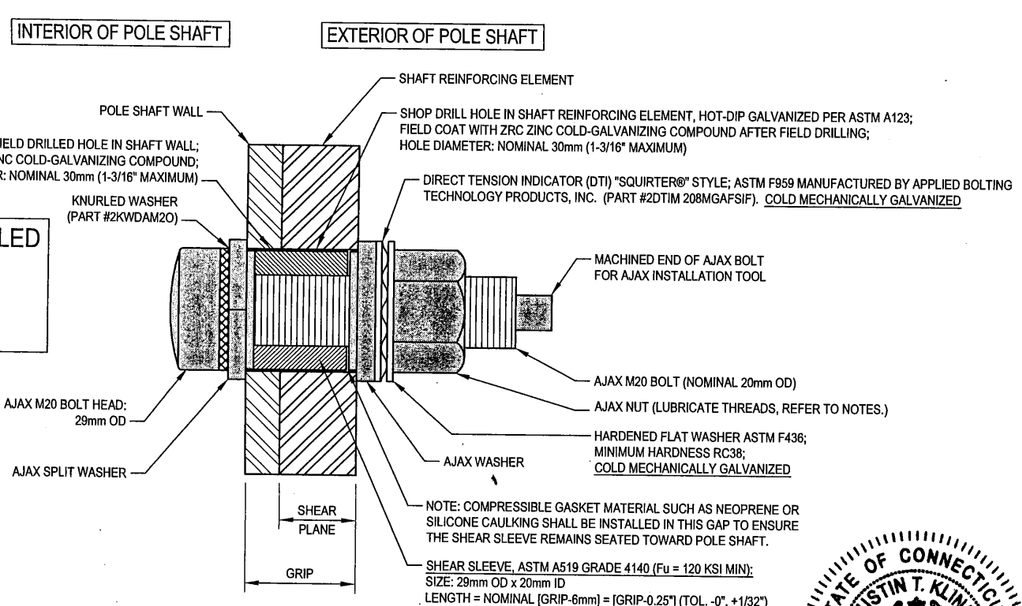
NOTE: COMPLETELY COMPRESSED DTI'S SHOWING NO VISIBLE REMAINING GAP ARE ACCEPTABLE. DTI WASHERS SHALL BE PLACED DIRECTLY AGAINST THE OUTER AJAX WASHER WITH THE DTI BUMPS FACING AWAY FROM THE AJAX WASHER. PLACE A HARDENED WASHER BETWEEN THE DTI AND THE AJAX NUT. THE DTI BUMPS SHALL BEAR AGAINST THE UNDERSIDE OF A HARDENED FLAT WASHER, NEVER DIRECTLY AGAINST THE NUT.

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

INSPECTION REQUIRED: ALL AJAX BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009, BY A QUALIFIED BOLT INSPECTOR. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE AJAX BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. IN ADDITION, ALL AJAX BOLTS AND DTI'S SHALL BE VISUALLY INSPECTED ACCORDING TO THE DTI MANUFACTURER'S INSTRUCTIONS. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE PHOTO DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THE CONDITION OF THE DTI'S.

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

NOTE: ALL AJAX BOLTS, AJAX SPLIT WASHERS, AJAX WASHERS, AJAX NUTS, AND SHEAR SLEEVES SHALL BE HOT DIP GALVANIZED PER ASTM A123 OR A153 AS APPROPRIATE. SHEAR SLEEVES MAY BE COLD GALVANIZED OR ZINC PLATED.



TYPICAL AJAX BOLT DETAIL 1 / S-2

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

6-8-15

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

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

BU #806361; NHV 102 943127
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700

DRAWN BY: C.A.W.	AJAX BOLT DETAIL
CHECKED BY: K.A.T.	
APPROVED BY: BKK	S-2
DATE: 06/08/2015	

37515-0830.004.DWG

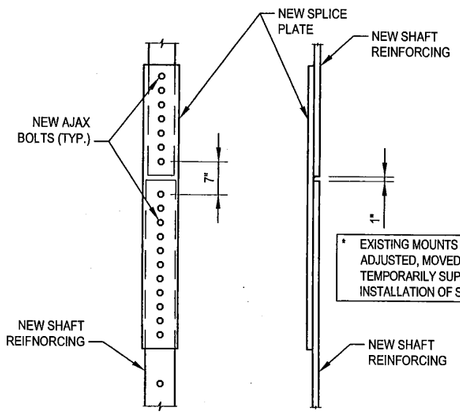
POLE SPECIFICATIONS	
POLE SHAPE TYPE:	12-SIDED POLYGON
TAPER:	0.187510 IN/FT
SHAFT STEEL:	Fy=65 KSI
BASE PL STEEL:	Fy=60 KSI
ANCHOR RODS:	2 1/4"ø #18J ASTM A615 GRADE 75

SHAFT SECTION DATA					
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN) @ TOP	DIAMETER ACROSS FLATS (IN) @ BOTTOM
1	54.83	0.1875	51.96	16.000	26.280
2	54.83	0.3125	63.96	25.092	35.380
3	50.00	0.3750		33.754	43.130
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES					

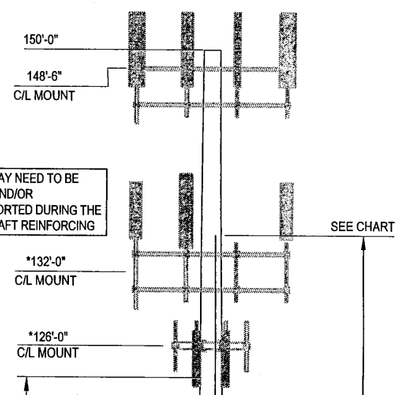
CONTRACTOR SHALL PROVIDE ASTM A36 SHIM PLATES BELOW SLIP JOINTS. THE SHIM PLATES SHALL BE PLACED BETWEEN THE NEW SHAFT REINFORCEMENT AND THE EXISTING POLE SHAFT FROM THE SLIP JOINT TO THE NEW SHAFT REINFORCEMENT SPLICE PLATE LOCATION AND A EXTRA LONG "SPLICE SHIM" SHALL BE PLACED BETWEEN THE NEW UPPER AND LOWER SHAFT REINFORCEMENT PLATES AT THE SHAFT REINFORCEMENT SPLICE PLATE LOCATION AND ALL TERMINATION POINTS, AS REQUIRED.

MODIFICATIONS:

- (A) INSTALL NEW TRANSITION STIFFENERS AT BASE PLATE. SEE SHEET S-4.
- (B) INSTALL NEW SHAFT REINFORCING. SEE CHART ON THIS SHEET.
- (C) REMOVAL OF BASE PLATE STIFFENERS. SEE SHEET S-4.
- (D) CONTRACTOR TO RELOCATE/REPLACE STEP PEGS AS NECESSARY. COORDINATE WITH CROWN CASTLE.
- (E) PAINT MODIFICATIONS TO MATCH EXISTING POLE. COORDINATE WITH CROWN CASTLE.



DETAIL 2 / S-3
SCALE: NTS



NEW CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE											
BOTTOM ELEVATION	TOP ELEVATION	FLAT # / DEGREE SEPARATION	ELEMENT	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE AJAX BOLTS PER ELEMENT	APPROXIMATE TOTAL AJAX BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
0' - 6"	35' - 6"	F9	CCI-AFP-06010035	35' - 0"	1	42	42	10	10	16"	715 LBS.
6' - 9"	35' - 6"	F5	1" x 6" (CUSTOM) #1	28' - 9"	1	37	37	10	10	16"	587 LBS.
9' - 9"	35' - 6"	F1	1" x 6" (CUSTOM) #2	25' - 9"	1	35	35	10	10	16"	526 LBS.
35' - 7"	70' - 7"	F1, F5 & F9	CCI-AFP-06010035	35' - 0"	3	42	126	10	10	16"	2144 LBS.
70' - 8"	93' - 3"	F1	1" x 4-1/2" (CUSTOM) #3	22' - 7"	1	27	27	8	8	20"	346 LBS.
70' - 8"	95' - 8"	F5 & F9	CCI-AFP-04510025	25' - 0"	2	28	56	8	8	20"	766 LBS.
94' - 10"	120' - 9"	F1	1" x 4-1/2" (CUSTOM) #4	25' - 11"	1	29	29	8	8	20"	397 LBS.
95' - 9"	120' - 9"	F5 & F9	CCI-AFP-04510025	25' - 0"	2	28	56	8	8	20"	766 LBS.
115' - 0"	135' - 0"	F2, F6 & F10	CCI-AFP-04510020	20' - 0"	3	25	75	8	8	20"	919 LBS.
							483				7166 LBS.

NOTES:

1.) AJAX BOLTS ARE TO BE 20mm DIAMETER WITH CORRESPONDING 29mm DIAMETER SLEEVE WITH MATCHING STEEL GRADE.
2.) 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.
3.) ALL REINFORCING SHALL BE ASTM A572 GR. 65.
4.) WELDS SHALL BE E80XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.
5.) HOLES FOR AJAX BOLTS AND SHEAR SLEEVES ARE 30mm UNLESS NOTED OTHERWISE.
6.) ALL SHIMS SHALL BE ASTM A-36.

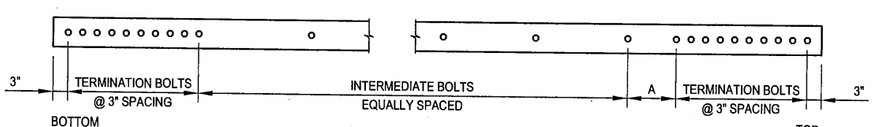
SPLICE PLATE INSTALLATION CHART								
ELEVATION	FLAT PLATE THICKNESS	FLAT PLATE WIDTH	FLAT PLATE LENGTH	FLAT PLATE QUANTITY	WELD LENGTH PER SIDE	TOTAL WELD LENGTH	AJAX BOLTS PER SPLICE*	TOTAL STEEL WEIGHT
35' - 7"	1"	6"	5' - 7"	3	0"	0"	20	342 LBS.
70' - 8"	1"	4-1/2"	5' - 1"	1	0"	0"	18	78 LBS.
70' - 8"	1"	4-1/2"	5' - 1"	2	0"	0"	18	156 LBS.
94' - 10"	1"	6"	6'-1"	1	0"	0"	16	95 LBS.
95' - 9"	1"	4-1/2"	4' - 7"	2	0"	0"	16	140 LBS.
						0"		811 LBS.

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

NEW SHIM CHART				
1/16" SHIM QUANTITY	1/4" SHIM QUANTITY	SHIM WIDTH	SHIM LENGTH	HOLE DIAMETER
33	0	4-1/2"	4"	1-1/4"
21	3	6"	4"	1-1/4"

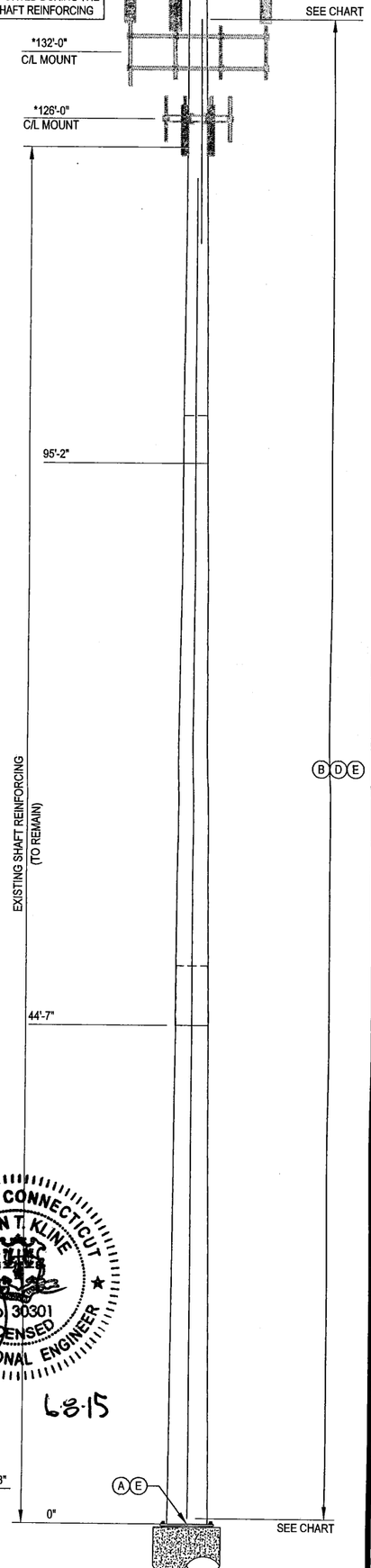
SHIMS ARE FOR BIDDING PURPOSES ONLY, FINAL SHIM REQUIREMENTS TO BE DETERMINED BY CONTRACTOR DURING FABRICATION.

NOTE: SPLICE PLATE AT 94'-10" JUMPS OVER A PORT ON FLAT 1. LENGTH OF SPLICE TO BE VERIFIED BY CONTRACTOR.



CUSTOM BOLTED BAR DETAIL
NOTE: "A" DIMENSION MAY VARY, NOT TO EXCEED MAXIMUM INTERMEDIATE BOLT SPACING

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



POLE ELEVATION 1 / S-3

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250 East Broad Street · Suite 600 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

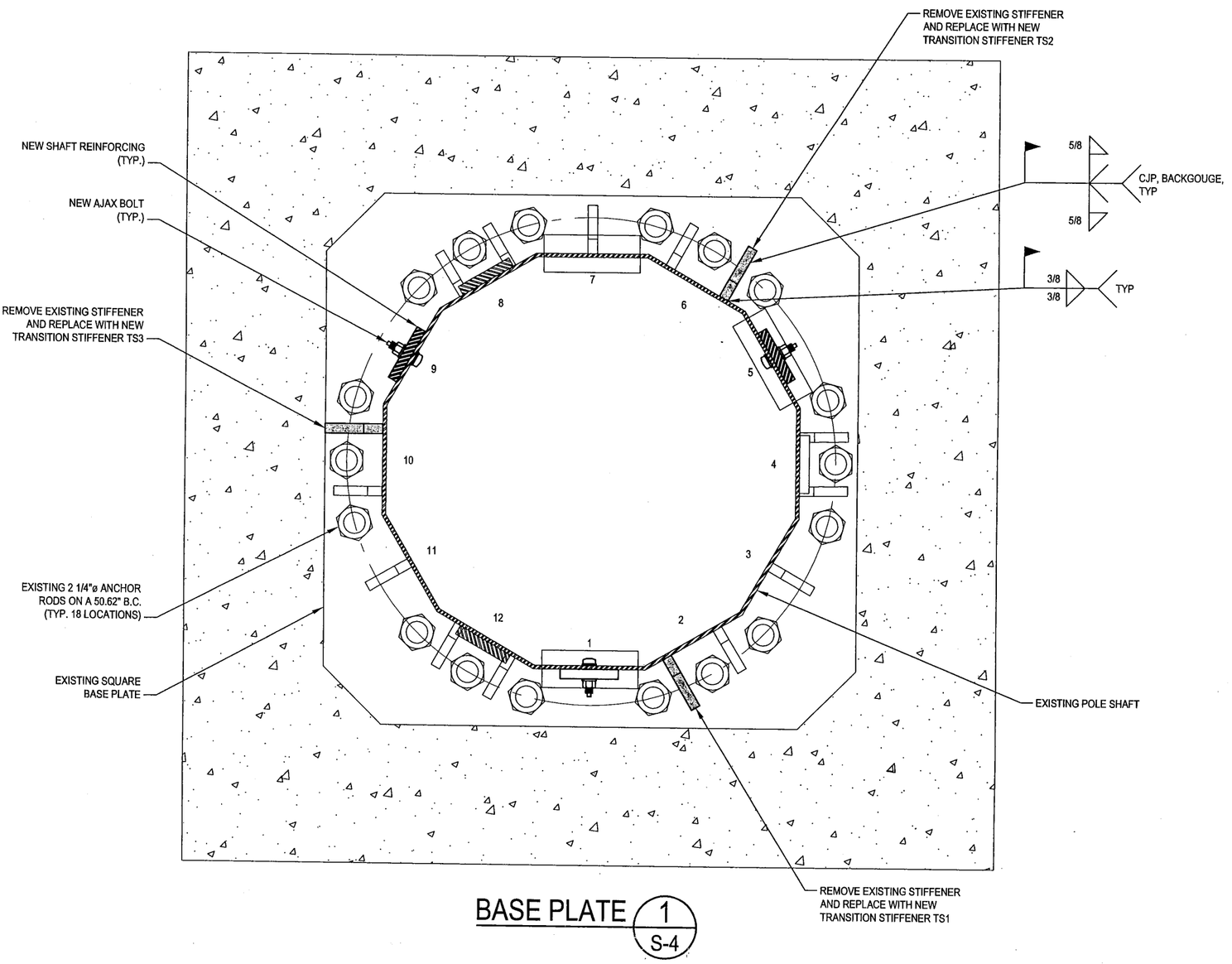
CROWN CASTLE
3530 TORINGDON WAY SUITE 300 CHARLOTTE, NC 28277
PH: (724) 416-2000

BU #806361; NHV 102 943127
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700

DRAWN BY: C.A.W.	MONOPOLE PROFILE
CHECKED BY: K.A.T.	
APPROVED BY: BKW	S-3
DATE: 06/08/2015	

37515-0830.004.DWG



BASE PLATE 1 / S-4

: REVISED ENTIRE BASE LAYOUT

STATE OF CONNECTICUT
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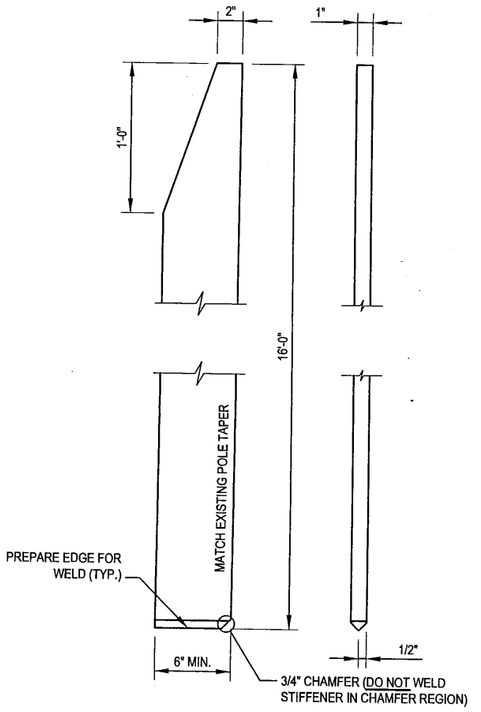
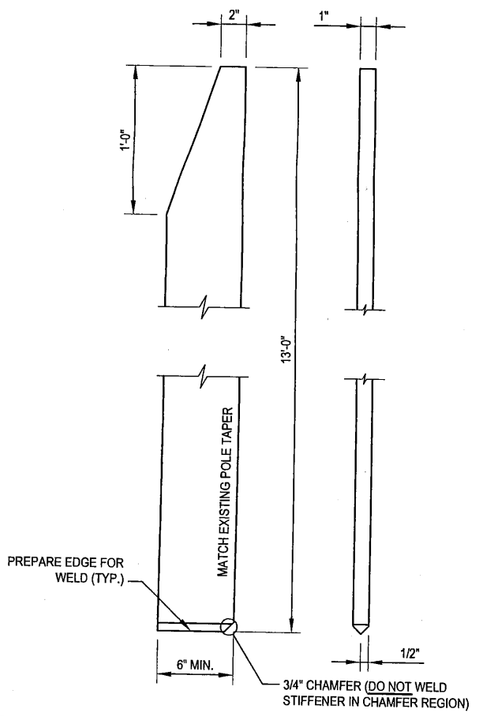
PROJECT: 37515-0830.004.7700

DRAWN BY: C.A.W.	BASE PLATE DETAILS
CHECKED BY: K.A.T.	
APPROVED BY: BKK	S-4
DATE: 06/08/2015	



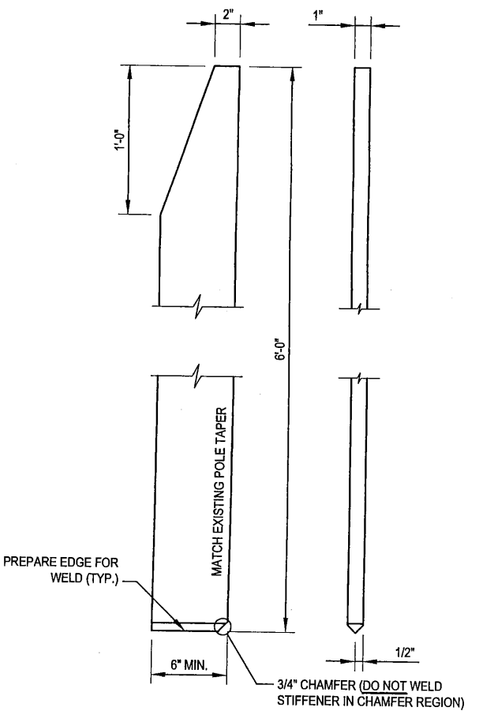
TRANSITION STIFFENER MK~TS1

(1 REQUIRED) (Fy = 65 KSI)



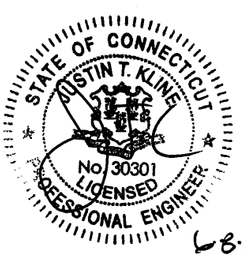
TRANSITION STIFFENER MK~TS2

(1 REQUIRED) (Fy = 65 KSI)



TRANSITION STIFFENER MK~TS3

(1 REQUIRED) (Fy = 65 KSI)



6.8.15

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(614) 221-6679 www.pjfweb.com

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BU #806361; NHV 102 943127
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MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700

DRAWN BY: C.A.W.	MISC DETAILS
CHECKED BY: K.A.T.	
APPROVED BY: BKK	S-5
DATE: 06/08/2015	

37515-0830.004.DWG

MODIFICATION INSPECTION NOTES:

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

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

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

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

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

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

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

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

9. **INSPECTION AND TESTING**
   - 9.1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY CROWN CASTLE'S REPRESENTATIVE AND CROWN CASTLE'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY.
   - 9.2. INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS ARE STILL REQUIRED WHEN THE EOR PERFORMS SUPPORT SERVICES DURING CONSTRUCTION.
   - 9.3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
   - 9.4. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED, RETAINED AND PAID FOR BY CROWN CASTLE FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.
     - 9.4.1. ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.
     - 9.4.2. THE INSPECTION AGENCY SHALL SO SCHEDULE THIS WORK AS TO CAUSE A MINIMUM OF INTERRUPTION TO, AND COORDINATE WITH, THE WORK IN PROGRESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE WORK SCHEDULE WITH THE TESTING AGENCY. THE CONTRACTOR SHALL ALLOW FOR ADEQUATE TIME AND ACCESS FOR THE TESTING AGENCY TO PERFORM THEIR DUTIES.
   - 9.5. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES AND INSPECT THE FOLLOWING ITEMS IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS. THE TESTING AGENCY SHALL INSPECT ITEMS ON THIS LIST AND OTHER ITEMS AS NECESSARY TO FULFILL THEIR RESPONSIBILITY. THE TESTING AGENCY SHALL UTILIZE EXPERIENCED, TRAINED INSPECTORS INCLUDING AWS CERTIFIED WELDING INSPECTORS (CWI). INSPECTORS SHALL HAVE THE TRAINING, CREDENTIALS, AND EXPERIENCE APPROPRIATE FOR AND COMMENSURATE WITH THE SCOPE AND TYPE OF INSPECTION WORK TO BE PERFORMED.
   - 9.6. **GENERAL**
     - 9.6.1. PERFORM PERIODIC ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY CROWN CASTLE AND THE EOR IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.
   - 9.7. **FOUNDATIONS AND SOIL PREPARATION - (NOT REQUIRED)**
   - 9.8. **CONCRETE TESTING PER ACI - (NOT REQUIRED)**
   - 9.9. **STRUCTURAL STEEL**
     - 9.9.1. CHECK STEEL ON THE JOB WITH THE PLANS.
     - 9.9.2. CHECK MILL CERTIFICATIONS. CALL FOR LABORATORY TEST REPORTS WHEN MILL CERTIFICATION IS IN QUESTION.
     - 9.9.3. CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.
     - 9.9.4. INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.
     - 9.9.5. CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.
     - 9.9.6. CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.
     - 9.9.7. CHECK THAT BOLTS HAVE BEEN TIGHTENED PROPERLY.
     - 9.9.8. 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
N/A	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
N/A	FABRICATOR NDE INSPECTION
N/A	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
	CONSTRUCTION
X	CONSTRUCTION INSPECTIONS
N/A	FOUNDATION INSPECTIONS
N/A	CONCRETE COMP. STRENGTH AND SLUMP TESTS
N/A	POST INSTALLED ANCHOR ROD VERIFICATION
N/A	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
N/A	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
N/A	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
X	INSPECTION OF ONE SIDED BOLTS AND DTI'S PER REQUIREMENTS ON SHEET S-2
N/A	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)
N/A	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
N/A	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
6.6.15

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

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

BU #806361; NHV 102 943127
GUILFORD, CONNECTICUT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37515-0830.004.7700

DRAWN BY: C.A.W.	MI CHECKLIST
CHECKED BY: K.A.T.	
APPROVED BY: BKK	S-6
DATE: 06/08/2015	

Exhibit C

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RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CTNH110C

NH110/ Crown Longhill_ETMP
131 Manor Road
Guilford, CT 06437

May 12, 2015

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general public allowable limit:	**41.32 %**

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

May 12, 2015

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CTNH110C – NH110/ Crown Longhill_ETMP**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **131 Manor Road, Guilford, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for both the PCS and AWS bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **131 Manor Road, Guilford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel

2) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

5) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

6) The antennas used in this modeling are the **RFS APX16DWV-16DWVS-E-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **RFS APX16DWV-16DWVS-E-A20** has a maximum gain of **16.3 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antenna mounting height centerline of the proposed antennas is **128 feet** above ground level (AGL).

8) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculations were done with respect to uncontrolled / general public threshold limits.

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	128	Height (AGL):	128	Height (AGL):	128
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	6	Channel Count	6	# PCS Channels:	6
Total TX Power:	240	Total TX Power:	240	# AWS Channels:	240
ERP (W):	10,237.91	ERP (W):	10,237.91	ERP (W):	10,237.91
Antenna A1 MPE%	2.47	Antenna B1 MPE%	2.47	Antenna C1 MPE%	2.47

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**7.42**
AT&T	17.13 %
Verizon Wireless	16.77 %
Site Total MPE %:	**41.32 %**

T-Mobile Sector 1 Total:	2.47 %
T-Mobile Sector 2 Total:	2.47 %
T-Mobile Sector 3 Total:	2.47 %
Site Total:	41.32 %

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Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector 1:	2.47 %
Sector 2:	2.47 %
Sector 3 :	2.47 %
T-Mobile Total:	7.42 %
Site Total:	41.32 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **41.32%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803