HPC Wireless Services
46 Mill Plain Rd.
y, CT, 06811
.797.1112

EM-CING-049-120803

HPC WIRELESS SERVICES

August 2, 2012

ORIGINAL

VIA OVERNIGHT COURIER

Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051
Attn: Ms. Linda Roberts, Executive Director

Re: New Cingular Wireless PCS, LLC – Exempt Modification
Oliver Road, Enfield, Connecticut

Dear Ms. Roberts:

This letter and attachments are submitted on behalf of New Cingular Wireless PCS, LLC ("AT&T"). AT&T is making modifications to certain existing sites in its Connecticut system in order to implement LTE technology. Please accept this letter and attachments as notification, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies ("R.S.C.A."), of construction that 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 Mayor of Enfield.

AT&T plans to modify the existing wireless communications facility owned by Crown Castle and located at Oliver Road, Enfield, (coordinates 41°-57'-36.16" N, 72°-35'-32.35" W). Attached are a compound plan and elevation depicting the planned changes, and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration, subject to modifications detailed in the attached structural documentation. Also included is a power density report reflecting the modification to AT&T's operations at the site.

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. 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. AT&T will install a new platform at the top of the tower and add three (3) LTE panel antennas with a center line of approximately 158'. Six (6) existing UMTS/GSM antennas will be relocated to the platform at a center line of 160'. Six (6) RRHs (remote radio heads) will be mounted behind the antennas, and one (1) surge arrestor will be

mounted to a new pipe behind the platform. AT&T will also place a DC and fiber run from the equipment to the antennas along the existing coaxial cable run. These changes will not extend the height of the approximately 160' structure.

2. AT&T will install one (1) new cabinet on a new H-Frame on the existing concrete pad for related equipment. A new GPS antenna will be mounted on the existing ice bridge. These changes will be within the existing compound and will have no effect on the site boundaries.

3. The proposed changes will not increase the noise level at the existing facility by six (6) decibels or more. The incremental effect of the proposed changes will be negligible.

4. The changes to the facility 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. As indicated on the attached report prepared by C Squared Systems, LLC, AT&T's operations at the site will result in a power density of approximately 1.28%; the combined site operations will result in a total power density of approximately 35.95%.

Please feel free to contact me by phone at (860) 798-7454 or by e-mail at jgaudet@hpcwireless.com with questions concerning this matter. Thank you for your consideration.

Respectfully yours,

Jennifer Young Gaudet

Jennifer Young Gaudet

Attachments

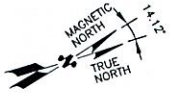
cc: Honorable Scott R. Kaupin, Mayor of Enfield
Matthew W. Coppler, Town Manager, Town of Enfield
Oliver Road Holding, LLC (underlying property owner)

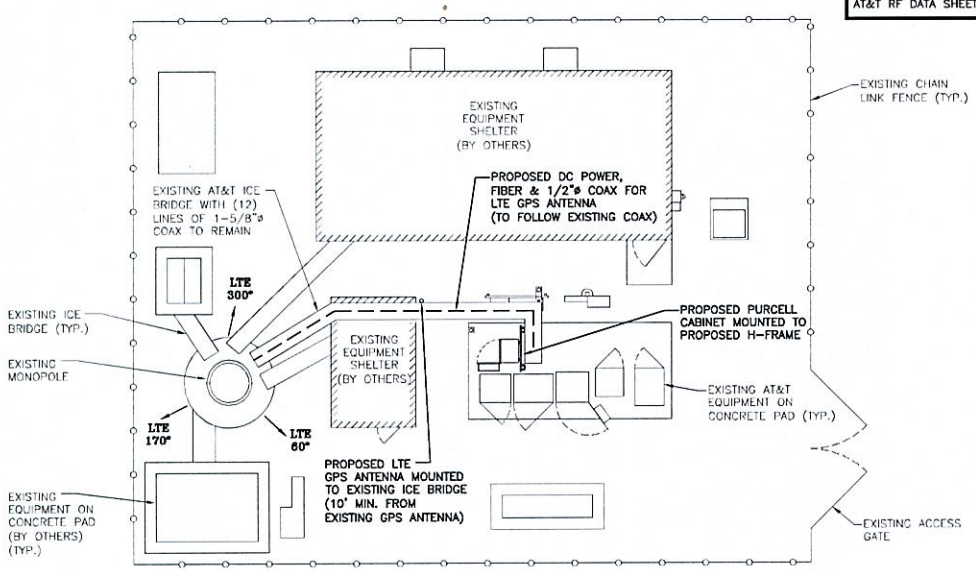
NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:

ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE AND FINAL AT&T RF DATA SHEET.

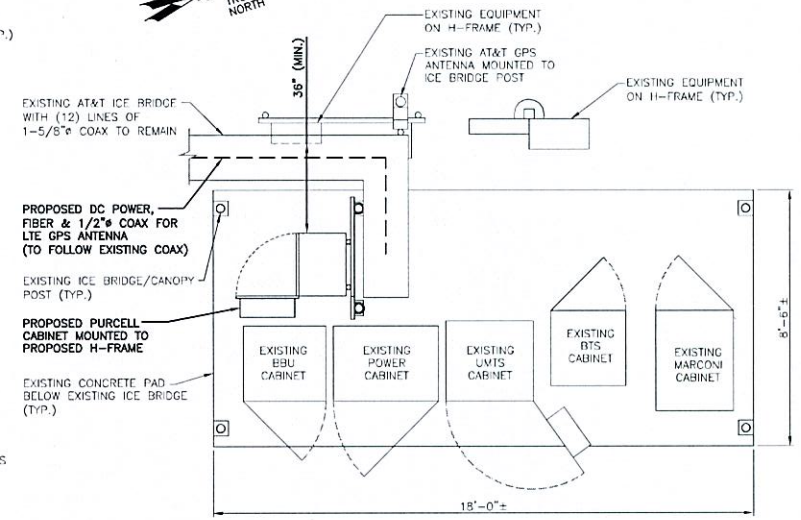




COMPOUND PLAN

SCALE: 3/16"=1'-0"

0 2'-8" 5'-4" 10'-8" 16'-0"



EQUIPMENT PLAN

SCALE: 1/2"=1'-0"

0 1'-0" 2'-0" 4'-0" 6'-0"

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 2-101
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

NEXLINK GLOBAL SERVICES
a UniTek GLOBAL SERVICES company
800 MARSHALL PHELPS ROAD UNIT#: 2A
WINDSOR, CT 06095

SITE NUMBER: CT5154
SITE NAME: ENFIELD-HARTFORD COUNTY
CROWN SITE #: 806373
4 OLIVER RD
ENFIELD, CT 06082
HARTFORD COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

NO.	DATE	REVISIONS	BY	CHK	APP'D
2	07/25/12	CONSTRUCTION REVISED	HC	DC	DPH
1	06/19/12	ISSUED FOR CONSTRUCTION	NB	DC	DPH
0	04/06/12	ISSUED FOR REVIEW	NB	DC	DPH

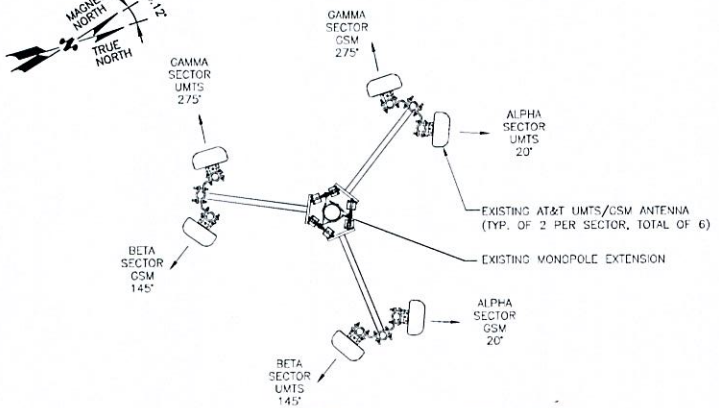
SCALE: AS SHOWN DESIGNED BY: HC DRAWN BY: NB

STATE OF CONNECTICUT — DANIEL P. HAMM — No. 24178 — LICENSED PROFESSIONAL ENGINEER

AT&T

COMPOUND & EQUIPMENT PLAN (LTE)

JOB NUMBER	DRAWING NUMBER	REV
5154.01	A-1	2



EXISTING UMTS/GSM ANTENNA PLAN

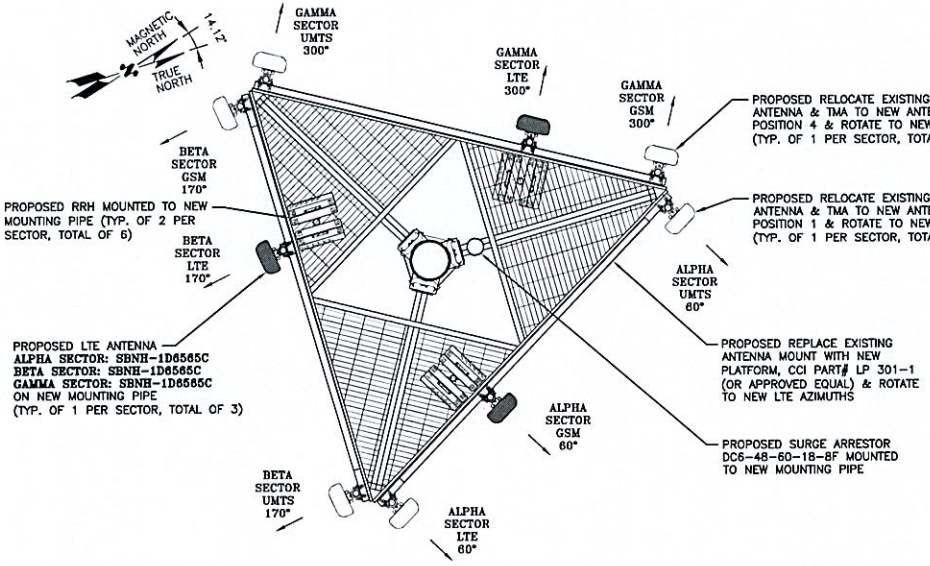
SCALE: N.T.S.

NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

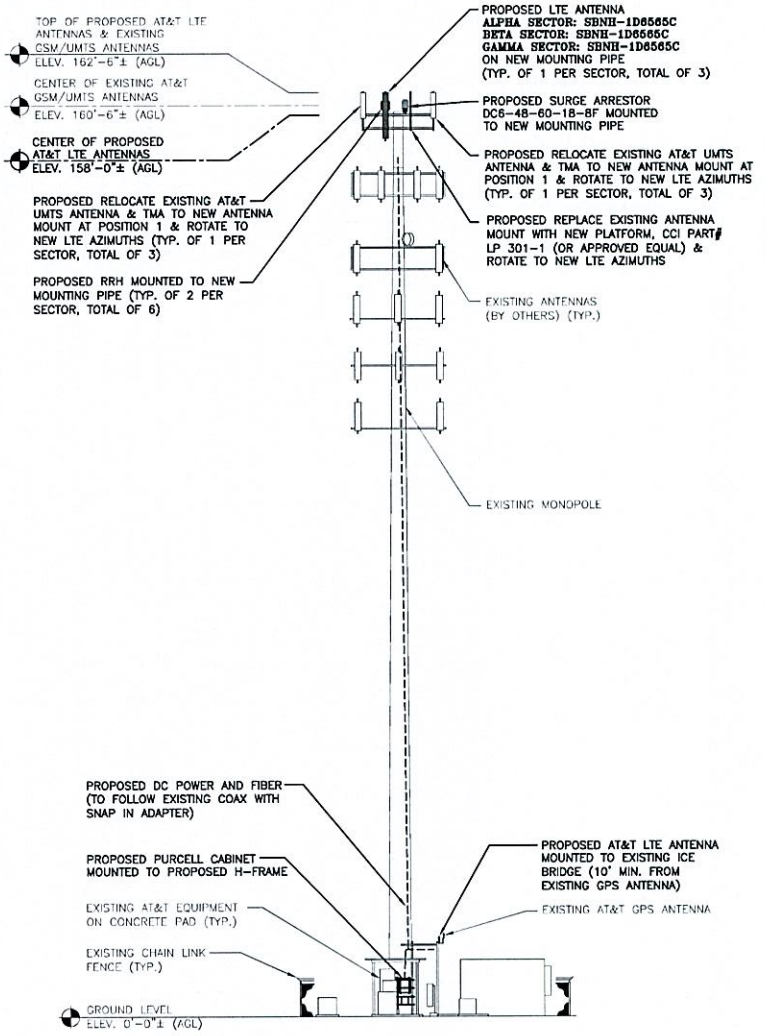
NOTE:

ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE AND FINAL AT&T RF DATA SHEET.



PROPOSED LTE ANTENNA PLAN

SCALE: N.T.S.



NORTHEAST ELEVATION

SCALE: 3/32"=1'-0"

0 5'-4" 10'-8" 21'-4" 32'-0"

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 2-101
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

NEXLINK GLOBAL SERVICES
a UniTek GLOBAL SERVICES company
800 MARSHALL PHELPS ROAD UNIT#: 2A
WINDSOR, CT 06095

SITE NUMBER: CT5154
SITE NAME: ENFIELD-HARTFORD COUNTY
CROWN SITE #: 806373
4 OLIVER RD
ENFIELD, CT 06082
HARTFORD COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

NO.	DATE	REVISIONS	BY	CHK	APP'D
2	07/25/12	CONSTRUCTION REVISED	NB	DC	DPH
1	06/19/12	ISSUED FOR CONSTRUCTION	NB	DC	DPH
0	04/06/12	ISSUED FOR REVIEW	NB	DC	DPH

SCALE: AS SHOWN | DESIGNED BY: HC | DRAWN BY: NB

STATE OF CONNECTICUT — DONALD H. HAMM — No. 24176 — LICENSED PROFESSIONAL ENGINEER

AT&T

ANTENNA PLAN AND ELEVATION (LTE)

JOB NUMBER	DRAWING NUMBER	REV
5154.01	A-2	2

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708

Date: **July 24, 2012**

Steve Tuttle
Crown Castle USA Inc.
The Piano Works349 West Commercial Street
East Rochester, NY 14445
(585) 899-3445

Paul J. Ford and Company
250 East Broad Street, Suite 1500
Columbus, Ohio 43215
(614) 221-6679
kthorpe@pjfweb.com

Subject: **Structural Modification Report**

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT5154
	Carrier Site Name:	AWE-Enfield
Crown Castle Designation:	**Crown Castle BU Number:**	806373
	Crown Castle Site Name:	HRT 101 943232
	Crown Castle JDE Job Number:	183413
	Crown Castle Work Order Number:	509202
	Crown Castle Application Number:	145016 Rev. 4
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37512-1571 BP
Site Data:	**4 Oliver Road, ENFIELD, Hartford County, CT**	
	Latitude *41° 57' 36.2"*, Longitude *-72° 35' 32.3"*	
	160 Foot - Monopole Tower w/ Replacement 10' Extension	

Dear Steve Tuttle,

Paul J. Ford and Company is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 474530, in accordance with application 145016, revision 4.

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

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

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

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

We at *Paul J. Ford and Company* appreciate the opportunity of providing our continuing professional services to you and Crown Castle USA Inc. 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 Engineer

tnxTower Report - version 6.0.3.0

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED
PROFESSIONAL ENGINEER

JUL 26 2012

TABLE OF CONTENTS

1) INTRODUCTION

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

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

4) ANALYSIS RESULTS
Table 4 – Section Capacity (Summary)
Table 5 - Tower Component Stresses vs. Capacity – LC4.5
4.1) Recommendations

5) APPENDIX A
TNXTower Output

6) APPENDIX B
Base Level Drawing

7) APPENDIX C
Additional Calculations

1) INTRODUCTION

This tower is a 160 ft Monopole tower designed by VALMONT in November of 1991.
The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-E.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
158.0	158.0	3	andrew	SBNH-1D6565C w/ Mount Pipe	2 1	3/4 3/8	-
		6	ericsson	RRUS-11			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 301-1]			
50.0	50.0	1	symmetricom	58532A	1	1/2	-
		1	tower mounts	Platform Mount [LP 301-1]			

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
158.0	161.0	6	powerwave technologies	LGP13519	12	7/8	3
		6		LGP21401			
151.0	151.0	1	tower mounts	Side Arm Mount [SO 101-3]	-	-	2
		1		Side Arm Mount [SO 701-3]			
149.0	149.0	1	antel	BXA-185063/8CF w/ Mount Pipe	12	7/8	1
		2		BXA-185090/8CFx2 w/ Mount Pipe			
		2		BXA-70063/6CFx4 w/ Mount Pipe			
		1		BXA-70063/6CFx6 w/ Mount Pipe			
		2		LPA-80063/4CF w/ Mount Pipe			
		4		LPA-80080/4CF w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 602-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
135.0	139.0	2	andrew	VHLP2.5-11	6 6 3	1-5/8 1/4 1/2	1
		2	dragonwave	HORIZON COMPACT			
	135.0	3	argus technologies	LLPX310R-V1 w/ Mount Pipe			
		6	decibel	DB980H90E-M w/ Mount Pipe			
		1	motorola	TIMING 2000			
		3	samsung telecommunications	WIMAX DAP HEAD			
		1	tower mounts	Platform Mount [LP 602-1]			
126.0	127.0	9	decibel	DB844H90E-XY w/ Mount Pipe	9	7/8	1
	126.0	1	tower mounts	T-Arm Mount [TA 901-3]			
116.0	117.0	3	andrew	ONEBASE TWIN DUAL DUPLEX TMA	6 6	1-1/4 1-5/8	1
		3	ems wireless	RR90-17-02DP w/ Mount Pipe			
		3	ericsson	KRY 112 71/1			
		3	rfs celwave	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe			
	116.0	1	tower mounts	Side Arm Mount [SO 103-3]			
		1		Side Arm Mount [SO 701-3]			
106.0	108.0	3	andrew	ATM200-A20	6 1	7/8 5/16	1
		3		HBX-6516DS-VTM w/ Mount Pipe			
	106.0	1	tower mounts	T-Arm Mount [TA 602-3]			
47.0	48.0	1	lucent	KS24019-L112A	1	1/2	1
	47.0	1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Equipment To Be Removed
3) Existing equipment to be relocated to the 158-ft level from the 151' level.

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH Engineering 07/26/2007	821582	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	SAC Engineering, Inc. 11/16/1991	821581	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont 11/09/1991	822743	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	PJF, 37512-1571, 05/30/2012	3195408	CCISITES

3.1) Analysis Method

tnxTower (version 6.0.3.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Monopole 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	160 - 150.5	Pole	TP20x20x0.25	1	-2.42	434.22	24.0	Pass
L2	150.5 - 150	Pole	TP20.3x20x0.25	2	-2.45	440.81	24.9	Pass
L3	150 - 119	Pole	TP26.6545x20.3x0.25	3	-8.34	1105.02	86.8	Pass
L4	119 - 97.1667	Pole	TP31.13x26.6545x0.3512	4	-12.29	1695.47	89.1	Pass
L5	97.1667 - 90.5	Pole	TP31.9973x29.4368x0.472	5	-15.14	2414.52	79.0	Pass
L6	90.5 - 60.5	Pole	TP38.149x31.9973x0.4827	6	-22.24	2943.93	93.1	Pass
L7	60.5 - 55	Pole	TP39.2768x38.149x0.5056	7	-23.73	3281.19	88.0	Pass
L8	55 - 30.5	Pole	TP43.5485x39.2768x0.5553	8	-32.89	3996.63	89.4	Pass
L9	30.5 - 0	Pole	TP49.8x43.5485x0.5594	9	-43.45	4610.85	92.6	Pass
							Summary	
						Pole (L6)	93.1	Pass
						RATING =	93.1	Pass

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

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	93.9	Pass
1	Base Plate	0	63.9	Pass
1	Base Foundation Structural Steel	0	67.6	Pass
1,2	Base Foundation Soil Interaction	0	85.1	Pass
1	Extension Connection	150	26.8	Pass

Structure Rating (max from all components) =	93.9%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) 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

See attached proposed modification drawings.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80.00 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56.00 pcf.
A wind speed of 37.60 mph is used in combination with ice.
Temperature drop of 50.00 °F.
Deflections calculated using a wind speed of 50.00 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, feedline 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				

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	160.0000-150.5000	9.5000	0.00	Round	20.0000	20.0000	0.2500		A53-B-35 (35 ksi)
L2	150.5000-150.0000	0.5000	0.00	Round	20.0000	20.3000	0.2500		A53-B-35 (35 ksi)
L3	150.0000-119.0000	31.0000	0.00	12	20.3000	26.6545	0.2500	1.0000	A572-65 (65 ksi)
L4	119.0000-97.1667	21.8333	4.83	12	26.6545	31.1300	0.3512	1.4048	Reinf 62.93 ksi (63 ksi)
L5	97.1667-90.5000	11.5000	0.00	12	29.4368	31.9973	0.4720	1.8879	Reinf 63.01 ksi (63 ksi)
L6	90.5000-60.5000	30.0000	0.00	12	31.9973	38.1490	0.4827	1.9309	Reinf 62.87 ksi (63 ksi)
L7	60.5000-	5.5000	0.00	12	38.1490	39.2768	0.5056	2.0222	Reinf 65.00 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
	55.0000								(65 ksi)
L8	55.0000-30.5000	24.5000	0.00	12	39.2768	43.5485	0.5553	2.2213	Reinf 65.00 ksi (65 ksi)
L9	30.5000-0.0000	30.5000		12	43.5485	49.8000	0.5594	2.2375	Reinf 65.00 ksi (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/ft
L1	20.0000	15.5116	756.8919	6.9915	10.0000	75.6892	1511.7218	7.7512	0.0000	0
	20.0000	15.5116	756.8919	6.9915	10.0000	75.6892	1511.7218	7.7512	0.0000	0
L2	20.0000	15.5116	756.8919	6.9915	10.0000	75.6892	1511.7218	7.7512	0.0000	0
	20.3000	15.7472	791.9097	7.0977	10.1500	78.0207	1581.6621	7.8689	0.0000	0
L3	21.0161	16.1403	828.1804	7.1779	10.5154	78.7588	1678.1181	7.9437	4.7704	19.082
	27.5948	21.2556	1891.5449	9.4528	13.8070	136.9986	3832.7829	10.4614	6.4734	25.894
L4	27.5948	29.7455	2626.8062	9.4166	13.8070	190.2512	5322.6215	14.6398	6.2022	17.66
	32.2281	34.8066	4208.7330	11.0188	16.1253	261.0012	8528.0342	17.1308	7.4016	21.075
L5	31.5894	44.0201	4713.8930	10.3694	15.2483	309.1425	9551.6252	21.6653	6.6242	14.035
	33.1261	47.9115	6077.7827	11.2861	16.5746	366.6922	12315.2355	23.5806	7.3104	15.489
L6	33.1261	48.9850	6209.7330	11.2822	16.5746	374.6532	12582.6026	24.1089	7.2816	15.085
	39.4947	58.5468	10602.1495	13.4845	19.7612	536.5145	21482.8292	28.8150	8.9302	18.5
L7	39.4947	61.2798	11083.6054	13.4763	19.7612	560.8782	22458.3894	30.1601	8.8690	17.543
	40.6623	63.1157	12109.9380	13.8801	20.3454	595.2188	24538.0176	31.0636	9.1713	18.141
L8	40.6623	69.2390	13250.7146	13.8623	20.3454	651.2894	26849.5402	34.0773	9.0379	16.275
	45.0847	76.8774	18137.7681	15.3916	22.5581	804.0460	36752.0355	37.8367	10.1827	18.337
L9	45.0847	77.4322	18265.1996	15.3901	22.5581	809.6950	37010.2463	38.1098	10.1719	18.184
	51.5568	88.6924	27448.5429	17.6281	25.7964	1064.0455	55618.1895	43.6517	11.8473	21.179

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 160.0000-150.5000				1	1	1		
L2 150.5000-150.0000				1	1	1		
L3 150.0000-119.0000				1	1	1		
L4 119.0000-97.1667				1	1	1		
L5 97.1667-90.5000				1	1	1		
L6 90.5000-60.5000				1	1	1		
L7 60.5000-55.0000				1	1	1		
L8 55.0000-30.5000				1	1	1		
L9 30.5000-0.0000				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
FB-L98B-002-75000(3/8")	C	No	CaAa (Out Of Face)	158.0000 - 0.0000	1	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.60
						1" Ice	0.0000	1.76
						2" Ice	0.0000	5.91
						4" Ice	0.0000	21.53
WR-VG86ST-BRD(3/4)	C	No	CaAa (Out Of Face)	158.0000 - 0.0000	2	No Ice	0.0000	0.59
						1/2" Ice	0.0000	1.37
						1" Ice	0.0000	2.76
						2" Ice	0.0000	7.37
						4" Ice	0.0000	23.92
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	158.0000 - 0.0000	3	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	CaAa (Out Of Face)	158.0000 - 0.0000	9	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
**								
LDF5-50A(7/8")	C	No	Inside Pole	149.0000 - 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
**								
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	135.0000 - 0.0000	3	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.76
						1" Ice	0.0000	2.00
						2" Ice	0.0000	6.30
						4" Ice	0.0000	22.23
LDF1-50A(1/4")	C	No	Inside Pole	135.0000 - 0.0000	6	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
2" Conduit	C	No	CaAa (Out Of Face)	135.0000 - 0.0000	1	No Ice	0.2000	0.95
						1/2" Ice	0.3000	2.48
						1" Ice	0.4000	4.62
						2" Ice	0.6000	10.72
						4" Ice	1.0000	30.27
LDF7-50A(1-5/8")	C	No	Inside Pole	135.0000 - 0.0000	6	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
**								
LDF5-50A(7/8")	C	No	CaAa (Out Of Face)	126.0000 - 0.0000	9	No Ice	0.0000	0.33
						1/2" Ice	0.0000	1.30
						1" Ice	0.0000	2.88
						2" Ice	0.0000	7.88
						4" Ice	0.0000	25.20
**								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	116.0000 - 0.0000	6	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	116.0000 - 0.0000	6	No Ice	0.0000	0.66
						1/2" Ice	0.0000	1.91
						1" Ice	0.0000	3.78
						2" Ice	0.0000	9.33
						4" Ice	0.0000	27.78
**								

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
FXL 780 PE(7/8)	C	No	CaAa (Out Of Face)	106.0000 - 0.0000	6	No Ice	0.0000	0.25
						1/2" Ice	0.0000	1.22
						1" Ice	0.0000	2.80
						2" Ice	0.0000	7.80
						4" Ice	0.0000	25.12
ATCB-B01(5/16)	C	No	CaAa (Out Of Face)	106.0000 - 0.0000	1	No Ice	0.0000	0.07
						1/2" Ice	0.0000	0.57
						1" Ice	0.0000	1.68
						2" Ice	0.0000	5.73
						4" Ice	0.0000	21.16
**								
FLC 12-50J(1/2")	C	No	CaAa (Out Of Face)	50.0000 - 0.0000	1	No Ice	0.0000	0.17
						1/2" Ice	0.0000	0.87
						1" Ice	0.0000	2.17
						2" Ice	0.0000	6.62
						4" Ice	0.0000	22.85
**								
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	47.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.84
						1" Ice	0.0000	2.14
						2" Ice	0.0000	6.58
						4" Ice	0.0000	22.78
**********								
***								
***								
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	90.5000 - 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
3/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	120.5000 - 90.5000	1	No Ice	0.1250	0.00
						1/2" Ice	0.2361	0.00
						1" Ice	0.3472	0.00
						2" Ice	0.5694	0.00
						4" Ice	1.0139	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	160.0000-150.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.455	0.08
L2	150.5000-150.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.297	0.01
L3	150.0000-119.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	21.802	0.59
L4	119.0000-97.1667	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	20.065	0.72
L5	97.1667-90.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.127	0.23
L6	90.5000-60.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	28.820	1.05
L7	60.5000-55.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.284	0.19
L8	55.0000-30.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	23.536	0.87
L9	30.5000-0.0000	A	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	29.300	1.08

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	160.0000-150.5000	A	1.204	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	9.874	0.59
L2	150.5000-150.0000	A	1.199	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.657	0.04
L3	150.0000-119.0000	A	1.183	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	47.987	3.04
L4	119.0000-97.1667	A	1.153	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	45.790	4.17
L5	97.1667-90.5000	A	1.134	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.982	1.42
L6	90.5000-60.5000	A	1.104	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	62.665	6.03
L7	60.5000-55.0000	A	1.069	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	11.296	1.06
L8	55.0000-30.5000	A	1.031	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	49.356	4.55
L9	30.5000-0.0000	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	60.478	5.45

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	160.0000-150.5000	-0.4754	0.2745	-0.7742	0.4470
L2	150.5000-150.0000	-0.5700	0.3291	-0.8975	0.5182
L3	150.0000-119.0000	-0.6792	0.3921	-1.0746	0.6204
L4	119.0000-97.1667	-0.8640	0.4988	-1.3965	0.8063
L5	97.1667-90.5000	-0.8825	0.5095	-1.4500	0.8371
L6	90.5000-60.5000	-0.9392	0.5423	-1.5265	0.8813
L7	60.5000-55.0000	-0.9616	0.5552	-1.5770	0.9105
L8	55.0000-30.5000	-0.9762	0.5636	-1.6020	0.9249
L9	30.5000-0.0000	-1.0008	0.5778	-1.6590	0.9578

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
SBNH-1D6565C w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.5561 12.2227 12.8929 14.2911 17.4280	9.7151 11.1857 12.5942 14.8689 19.6184	0.09 0.18 0.28 0.51 1.14
SBNH-1D6565C w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.5561 12.2227 12.8929 14.2911 17.4280	9.7151 11.1857 12.5942 14.8689 19.6184	0.09 0.18 0.28 0.51 1.14
SBNH-1D6565C w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.5561 12.2227 12.8929 14.2911 17.4280	9.7151 11.1857 12.5942 14.8689 19.6184	0.09 0.18 0.28 0.51 1.14
(2) 7770.00 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.06 0.10 0.16 0.29 0.66
DC6-48-60-18-8F	A	From Face	4.0000 0.00 0.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5667 2.7978 3.0377 3.5432 4.6580	4.3167 4.5965 4.8849 5.4877 6.7969	0.02 0.05 0.09 0.17 0.38
(2) RRUS-11	A	From Face	4.0000 0.00 0.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.4236 4.7079 5.0009 5.6127 6.9402	1.1855 1.3512 1.5256 1.9002 2.7532	0.05 0.07 0.10 0.17 0.36
(2) RRUS-11	B	From Face	4.0000 0.00 0.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.4236 4.7079 5.0009 5.6127 6.9402	1.1855 1.3512 1.5256 1.9002 2.7532	0.05 0.07 0.10 0.17 0.36
(2) RRUS-11	C	From Face	4.0000 0.00 0.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.4236 4.7079 5.0009 5.6127 6.9402	1.1855 1.3512 1.5256 1.9002 2.7532	0.05 0.07 0.10 0.17 0.36
(2) LGP13519	A	From Face	4.0000 0.00 3.00	0.0000	158.0000	No Ice 1/2" Ice Ice 1" Ice 2" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
(2) LGP13519	B	From Face	4.0000 0.00 3.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
(2) LGP13519	C	From Face	4.0000 0.00 3.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
(2) LGP21401	A	From Face	4.0000 0.00 3.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Face	4.0000 0.00 3.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	C	From Face	4.0000 0.00 3.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.01 0.02 0.03 0.05 0.14
Platform Mount [LP 301-1]	C	None		0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	30.1000 40.8000 51.5000 72.9000 115.7000	30.1000 40.8000 51.5000 72.9000 115.7000	1.59 2.03 2.47 3.35 5.11
***									
(2) LPA-80063/4CF w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.2481 7.7190 8.2003 9.1945 11.3199	7.2599 7.9574 8.6723 10.1556 13.3910	0.04 0.10 0.18 0.34 0.80
(2) LPA-80080/4CF w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.8561 3.2195 3.5922 4.4498 6.3182	7.2274 7.9217 8.6338 10.1119 13.3391	0.03 0.07 0.13 0.25 0.61
(2) LPA-80080/4CF w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.8561 3.2195 3.5922 4.4498 6.3182	7.2274 7.9217 8.6338 10.1119 13.3391	0.03 0.07 0.13 0.25 0.61
BXA-70063/6CFx6 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.9686 8.6091 9.2158 10.4591 13.0655	5.3981 6.5465 7.4089 9.1837 12.9333	0.04 0.10 0.17 0.33 0.79
BXA-70063/6CFx4 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice	7.9686 8.6091 9.2158	5.3981 6.5465 7.4089	0.04 0.10 0.17

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	10.4591	9.1837	0.33
						2" Ice	13.0655	12.9333	0.79
						4" Ice			
BXA-70063/6CFx4 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice	7.9686	5.3981	0.04
						1/2" Ice	8.6091	6.5465	0.10
						1" Ice	9.2158	7.4089	0.17
						2" Ice	10.4591	9.1837	0.33
						4" Ice	13.0655	12.9333	0.79
BXA-185063/8CF w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice	3.1811	2.9966	0.03
						1/2" Ice	3.5589	3.6145	0.06
						1" Ice	3.9627	4.2361	0.09
						2" Ice	4.8550	5.5293	0.19
						4" Ice	6.7735	8.4233	0.47
BXA-185090/8CFx2 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice	3.1574	3.3303	0.03
						1/2" Ice	3.5312	3.9423	0.06
						1" Ice	3.9415	4.5633	0.10
						2" Ice	4.8273	5.8553	0.19
						4" Ice	6.7342	8.8407	0.49
BXA-185090/8CFx2 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice	3.1574	3.3303	0.03
						1/2" Ice	3.5312	3.9423	0.06
						1" Ice	3.9415	4.5633	0.10
						2" Ice	4.8273	5.8553	0.19
						4" Ice	6.7342	8.8407	0.49
(2) FD9R6004/2C-3L	A	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice	0.3665	0.0846	0.00
						1/2" Ice	0.4506	0.1362	0.01
						1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
(2) FD9R6004/2C-3L	B	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice	0.3665	0.0846	0.00
						1/2" Ice	0.4506	0.1362	0.01
						1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
(2) FD9R6004/2C-3L	C	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice	0.3665	0.0846	0.00
						1/2" Ice	0.4506	0.1362	0.01
						1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
Platform Mount [LP 602-1]	C	None		0.0000	149.0000	No Ice	32.0300	32.0300	1.34
						1/2" Ice	38.7100	38.7100	1.80
						1" Ice	45.3900	45.3900	2.26
						2" Ice	58.7500	58.7500	3.17
						4" Ice	85.4700	85.4700	5.00
***									
LLPX310R-V1 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice	5.0651	2.9834	0.05
						1/2" Ice	5.4798	3.5263	0.08
						1" Ice	5.9052	4.0859	0.13
						2" Ice	6.7881	5.3127	0.23
						4" Ice	8.7045	8.1308	0.54
LLPX310R-V1 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice	5.0651	2.9834	0.05
						1/2" Ice	5.4798	3.5263	0.08
						1" Ice	5.9052	4.0859	0.13
						2" Ice	6.7881	5.3127	0.23
						4" Ice	8.7045	8.1308	0.54
LLPX310R-V1 w/ Mount	C	From Face	4.0000	0.0000	135.0000	No Ice	5.0651	2.9834	0.05

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
Pipe			0.00 0.00			1/2" Ice	5.4798 5.9052	3.5263 4.0859	0.08 0.13
						1" Ice	6.7881	5.3127	0.23
						2" Ice	8.7045	8.1308	0.54
						4" Ice			
WIMAX DAP HEAD	A	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice	1.8044 1.9877	0.7778 0.9182	0.03 0.04
						1" Ice	2.1795	1.0673	0.06
						2" Ice	2.5891	1.3914	0.09
						4" Ice	3.5121	2.1432	0.20
WIMAX DAP HEAD	B	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice	1.8044 1.9877	0.7778 0.9182	0.03 0.04
						1" Ice	2.1795	1.0673	0.06
						2" Ice	2.5891	1.3914	0.09
						4" Ice	3.5121	2.1432	0.20
WIMAX DAP HEAD	C	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice	1.8044 1.9877	0.7778 0.9182	0.03 0.04
						1" Ice	2.1795	1.0673	0.06
						2" Ice	2.5891	1.3914	0.09
						4" Ice	3.5121	2.1432	0.20
HORIZON COMPACT	A	From Face	4.0000 0.00 4.00	0.0000	135.0000	No Ice 1/2" Ice	0.8409 0.9658	0.4295 0.5249	0.01 0.02
						1" Ice	1.0993	0.6289	0.03
						2" Ice	1.3922	0.8629	0.05
						4" Ice	2.0819	1.4345	0.12
HORIZON COMPACT	C	From Face	4.0000 0.00 4.00	0.0000	135.0000	No Ice 1/2" Ice	0.8409 0.9658	0.4295 0.5249	0.01 0.02
						1" Ice	1.0993	0.6289	0.03
						2" Ice	1.3922	0.8629	0.05
						4" Ice	2.0819	1.4345	0.12
TIMING 2000	A	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice	0.1258 0.1771	0.1258 0.1771	0.00 0.00
						1" Ice	0.2370	0.2370	0.01
						2" Ice	0.3827	0.3827	0.01
						4" Ice	0.7778	0.7778	0.05
(2) DB980H90E-M w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice	4.0361 4.4987	3.6194 4.4808	0.03 0.06
						1" Ice	4.9468	5.2186	0.11
						2" Ice	5.8700	6.7442	0.22
						4" Ice	8.0460	9.9954	0.55
(2) DB980H90E-M w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice	4.0361 4.4987	3.6194 4.4808	0.03 0.06
						1" Ice	4.9468	5.2186	0.11
						2" Ice	5.8700	6.7442	0.22
						4" Ice	8.0460	9.9954	0.55
(2) DB980H90E-M w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice	4.0361 4.4987	3.6194 4.4808	0.03 0.06
						1" Ice	4.9468	5.2186	0.11
						2" Ice	5.8700	6.7442	0.22
						4" Ice	8.0460	9.9954	0.55
Platform Mount [LP 602-1]	C	None		0.0000	135.0000	No Ice 1/2" Ice	32.0300 38.7100	32.0300 38.7100	1.34 1.80
						1" Ice	45.3900	45.3900	2.26
						2" Ice	58.7500	58.7500	3.17
						4" Ice	85.4700	85.4700	5.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***									
(3) DB844H90E-XY w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.0000	126.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2986 3.6900 4.1185 5.0070 6.9197	4.9208 5.5962 6.2837 7.7123 10.8330	0.03 0.07 0.12 0.23 0.56
(3) DB844H90E-XY w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.0000	126.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2986 3.6900 4.1185 5.0070 6.9197	4.9208 5.5962 6.2837 7.7123 10.8330	0.03 0.07 0.12 0.23 0.56
(3) DB844H90E-XY w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.0000	126.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2986 3.6900 4.1185 5.0070 6.9197	4.9208 5.5962 6.2837 7.7123 10.8330	0.03 0.07 0.12 0.23 0.56
T-Arm Mount [TA 901-3]	C	None		0.0000	126.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	17.5000 20.7000 23.9000 30.3000 43.1000	17.5000 20.7000 23.9000 30.3000 43.1000	0.75 1.00 1.26 1.76 2.76
***									
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.9361 7.4389 7.9415 8.9779 11.1750	3.2893 3.9953 4.6615 6.0439 9.0230	0.06 0.10 0.16 0.28 0.65
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.9361 7.4389 7.9415 8.9779 11.1750	3.2893 3.9953 4.6615 6.0439 9.0230	0.06 0.10 0.16 0.28 0.65
APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.9361 7.4389 7.9415 8.9779 11.1750	3.2893 3.9953 4.6615 6.0439 9.0230	0.06 0.10 0.16 0.28 0.65
RR90-17-02DP w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.5931 5.0883 5.5778 6.5876 8.7306	3.3194 4.0888 4.7844 6.2255 9.3076	0.03 0.07 0.11 0.22 0.56
RR90-17-02DP w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.5931 5.0883 5.5778 6.5876 8.7306	3.3194 4.0888 4.7844 6.2255 9.3076	0.03 0.07 0.11 0.22 0.56
RR90-17-02DP w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.5931 5.0883 5.5778 6.5876 8.7306	3.3194 4.0888 4.7844 6.2255 9.3076	0.03 0.07 0.11 0.22 0.56
KRY 112 71/1	A	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice 1/2" Ice	0.6806 0.8022 0.9325	0.4497 0.5590 0.6769	0.01 0.02 0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	1.2190	0.9388	0.04
						2" Ice	1.8956	1.5662	0.11
						4" Ice			
KRY 112 71/1	B	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	0.6806	0.4497	0.01
						1/2" Ice	0.8022	0.5590	0.02
						0.9325	0.6769	0.03	
						1" Ice	1.2190	0.9388	0.04
						2" Ice	1.8956	1.5662	0.11
						4" Ice			
KRY 112 71/1	C	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	0.6806	0.4497	0.01
						1/2" Ice	0.8022	0.5590	0.02
						0.9325	0.6769	0.03	
						1" Ice	1.2190	0.9388	0.04
						2" Ice	1.8956	1.5662	0.11
						4" Ice			
ONEBASE TWIN DUAL DUPLEX TMA	A	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	0.6737	0.3063	0.01
						1/2" Ice	0.7863	0.3916	0.02
						0.9075	0.4856	0.02	
						1" Ice	1.1758	0.6995	0.04
						2" Ice	1.8162	1.2309	0.10
						4" Ice			
ONEBASE TWIN DUAL DUPLEX TMA	B	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	0.6737	0.3063	0.01
						1/2" Ice	0.7863	0.3916	0.02
						0.9075	0.4856	0.02	
						1" Ice	1.1758	0.6995	0.04
						2" Ice	1.8162	1.2309	0.10
						4" Ice			
ONEBASE TWIN DUAL DUPLEX TMA	C	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	0.6737	0.3063	0.01
						1/2" Ice	0.7863	0.3916	0.02
						0.9075	0.4856	0.02	
						1" Ice	1.1758	0.6995	0.04
						2" Ice	1.8162	1.2309	0.10
						4" Ice			
Side Arm Mount [SO 103-3]	C	None		0.0000	116.0000	No Ice	9.5000	9.5000	0.22
						1/2" Ice	11.8000	11.8000	0.32
						14.1000	14.1000	0.41	
						1" Ice	18.7000	18.7000	0.60
						2" Ice	27.9000	27.9000	0.97
						4" Ice			
Side Arm Mount [SO 701-3]	C	None		0.0000	116.0000	No Ice	2.8300	2.8300	0.20
						1/2" Ice	3.9200	3.9200	0.24
						5.0100	5.0100	0.28	
						1" Ice	7.1900	7.1900	0.36
						2" Ice	11.5500	11.5500	0.53
						4" Ice			
***									
HBX-6516DS-VTM w/ Mount Pipe	A	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice	3.5975	3.2406	0.03
						1/2" Ice	3.9981	3.9135	0.06
						4.4346	4.5638	0.10	
						1" Ice	5.3677	5.9143	0.20
						2" Ice	7.3611	8.8773	0.50
						4" Ice			
HBX-6516DS-VTM w/ Mount Pipe	B	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice	3.5975	3.2406	0.03
						1/2" Ice	3.9981	3.9135	0.06
						4.4346	4.5638	0.10	
						1" Ice	5.3677	5.9143	0.20
						2" Ice	7.3611	8.8773	0.50
						4" Ice			
HBX-6516DS-VTM w/ Mount Pipe	C	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice	3.5975	3.2406	0.03
						1/2" Ice	3.9981	3.9135	0.06
						4.4346	4.5638	0.10	
						1" Ice	5.3677	5.9143	0.20
						2" Ice	7.3611	8.8773	0.50
						4" Ice			
ATM200-A20	A	From Face	4.0000	0.0000	106.0000	No Ice	0.2178	0.1633	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 2.00			1/2" Ice	0.2921 0.3751	0.2331 0.3115	0.00 0.01
						1" Ice	0.5669	0.4943	0.02
						2" Ice	1.0543	0.9636	0.06
						4" Ice			
ATM200-A20	B	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.2178 0.2921 0.3751 0.5669 1.0543	0.1633 0.2331 0.3115 0.4943 0.9636	0.00 0.00 0.01 0.02 0.06
ATM200-A20	C	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.2178 0.2921 0.3751 0.5669 1.0543	0.1633 0.2331 0.3115 0.4943 0.9636	0.00 0.00 0.01 0.02 0.06
T-Arm Mount [TA 602-3]	C	None		0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.5900 15.4400 19.2900 26.9900 42.3900	11.5900 15.4400 19.2900 26.9900 42.3900	0.77 0.99 1.21 1.64 2.50
***									
58532A	C	From Face	2.0000 0.00 0.00	0.0000	50.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.2209 0.2897 0.3672 0.5481 1.0137	0.2209 0.2897 0.3672 0.5481 1.0137	0.00 0.00 0.01 0.02 0.06
Platform Mount [LP 301-1]	C	None		0.0000	50.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	30.1000 40.8000 51.5000 72.9000 115.7000	30.1000 40.8000 51.5000 72.9000 115.7000	1.59 2.03 2.47 3.35 5.11
***									
KS24019-L112A	B	From Face	2.0000 0.00 1.00	0.0000	47.0000	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
Side Arm Mount [SO 701-1]	B	None		0.0000	47.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.8500 1.1400 1.4300 2.0100 3.1700	1.6700 2.3400 3.0100 4.3500 7.0300	0.07 0.08 0.09 0.12 0.18

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP2.5-11	A	Paraboloid w/Shroud (HP)	From Face	4.0000 0.00	0.0000		135.0000	2.9167	No Ice 1/2" Ice	6.6800 7.0700	0.05 0.08

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
				4.00					1" Ice	7.4600	0.12
									2" Ice	8.2300	0.19
									4" Ice	9.7800	0.34
VHLP2.5-11	C	Paraboloid w/Shroud (HP)	From Face	4.0000	0.0000		135.0000	2.9167	No Ice	6.6800	0.05
				0.00					1/2" Ice	7.0700	0.08
				4.00					1" Ice	7.4600	0.12
									2" Ice	8.2300	0.19
									4" Ice	9.7800	0.34

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	160 - 150.5	Pole	Max Tension	11	0.00	-0.00	-0.00
			Max. Compression	14	-7.21	0.92	-0.03
			Max. Mx	11	-2.42	45.12	-0.27
			Max. My	2	-2.42	-0.16	45.27

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	5	6.13	-44.84	0.17
			Max. Vx	2	-6.17	-0.16	45.27
			Max. Torque	9			-0.91
L2	150.5 - 150	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-7.29	0.96	-0.05
			Max. Mx	11	-2.45	48.20	-0.29
			Max. My	2	-2.45	-0.16	48.36
			Max. Vy	11	-6.17	48.20	-0.29
			Max. Vx	8	6.21	0.29	-48.33
			Max. Torque	9			-0.92
L3	150 - 119	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.62	5.22	-1.88
			Max. Mx	11	-8.37	506.11	5.06
			Max. My	2	-8.38	7.16	503.38
			Max. Vy	5	20.25	-505.92	-7.35
			Max. Vx	2	-20.16	7.16	503.38
			Max. Torque	2			1.73
L4	119 - 97.1667	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33.90	8.91	-3.98
			Max. Mx	5	-12.31	-898.93	-12.68
			Max. My	2	-12.33	12.14	895.00
			Max. Vy	5	25.20	-898.93	-12.68
			Max. Vx	2	-25.10	12.14	895.00
			Max. Torque	2			1.88
L5	97.1667 - 90.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-39.34	11.70	-5.56
			Max. Mx	5	-15.16	-1198.24	-16.31
			Max. My	2	-15.18	15.54	1193.37
			Max. Vy	5	26.87	-1198.24	-16.31
			Max. Vx	2	-26.78	15.54	1193.37
			Max. Torque	2			2.00
L6	90.5 - 60.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-52.36	19.77	-10.19
			Max. Mx	5	-22.26	-2062.66	-25.87
			Max. My	2	-22.27	24.55	2055.41
			Max. Vy	5	30.92	-2062.66	-25.87
			Max. Vx	2	-30.82	24.55	2055.41
			Max. Torque	2			2.31
L7	60.5 - 55	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-54.87	21.30	-11.07
			Max. Mx	5	-23.74	-2234.37	-27.63
			Max. My	2	-23.75	26.21	2226.69
			Max. Vy	5	31.62	-2234.37	-27.63
			Max. Vx	2	-31.53	26.21	2226.69
			Max. Torque	2			2.37
L8	55 - 30.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-69.48	28.20	-15.06
			Max. Mx	5	-32.89	-3064.52	-35.42
			Max. My	2	-32.90	33.61	3054.97
			Max. Vy	5	35.64	-3064.52	-35.42
			Max. Vx	2	-35.54	33.61	3054.97
			Max. Torque	2			2.62
L9	30.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-85.38	37.10	-20.18
			Max. Mx	5	-43.45	-4200.73	-45.03
			Max. My	2	-43.45	42.80	4188.98
			Max. Vy	5	39.03	-4200.73	-45.03
			Max. Vx	2	-38.94	42.80	4188.98
			Max. Torque	2			2.97

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	85.38	-0.00	0.00
	Max. H_x	11	43.47	38.93	0.20
	Max. H_z	2	43.47	0.25	38.91
	Max. M_x	2	4188.98	0.25	38.91
	Max. M_z	5	4200.73	-39.00	-0.28
	Max. Torsion	2	2.97	0.25	38.91
	Min. Vert	11	43.47	38.93	0.20
	Min. H_x	5	43.47	-39.00	-0.28
	Min. H_z	8	43.47	-0.32	-38.86
	Min. M_x	8	-4186.44	-0.32	-38.86
	Min. M_z	11	-4200.61	38.93	0.20
	Min. Torsion	7	-2.80	-19.68	-33.78

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	43.47	0.00	-0.00	2.69	5.00	-0.00
Dead+Wind 0 deg - No Ice	43.47	-0.25	-38.91	-4188.98	42.80	-2.97
Dead+Wind 30 deg - No Ice	43.47	19.26	-33.65	-3619.96	-2061.38	-2.39
Dead+Wind 60 deg - No Ice	43.47	33.66	-19.28	-2066.14	-3619.42	-0.72
Dead+Wind 90 deg - No Ice	43.47	39.00	0.28	45.03	-4200.73	1.14
Dead+Wind 120 deg - No Ice	43.47	33.84	19.68	2131.23	-3647.26	2.25
Dead+Wind 150 deg - No Ice	43.47	19.68	33.78	3645.28	-2125.08	2.80
Dead+Wind 180 deg - No Ice	43.47	0.32	38.86	4186.44	-42.00	2.79
Dead+Wind 210 deg - No Ice	43.47	-19.29	33.55	3610.96	2077.03	2.38
Dead+Wind 240 deg - No Ice	43.47	-33.63	19.26	2069.47	3625.88	0.72
Dead+Wind 270 deg - No Ice	43.47	-38.93	-0.20	-27.57	4200.61	-1.13
Dead+Wind 300 deg - No Ice	43.47	-33.77	-19.71	-2130.15	3646.26	-2.08
Dead+Wind 330 deg - No Ice	43.47	-19.65	-33.80	-3642.77	2130.14	-2.80
Dead+Ice+Temp	85.38	0.00	-0.00	20.18	37.10	-0.00
Dead+Wind 0 deg+Ice+Temp	85.38	-0.06	-11.77	-1330.34	46.79	-1.11
Dead+Wind 30 deg+Ice+Temp	85.38	5.83	-10.18	-1147.63	-630.40	-0.82
Dead+Wind 60 deg+Ice+Temp	85.38	10.18	-5.84	-648.24	-1130.73	-0.19
Dead+Wind 90 deg+Ice+Temp	85.38	11.79	0.07	31.06	-1316.67	0.49
Dead+Wind 120 deg+Ice+Temp	85.38	10.22	5.94	703.87	-1137.78	0.92
Dead+Wind 150 deg+Ice+Temp	85.38	5.94	10.21	1192.99	-646.65	1.12
Dead+Wind 180 deg+Ice+Temp	85.38	0.08	11.75	1368.78	25.06	1.07
Dead+Wind 210 deg+Ice+Temp	85.38	-5.84	10.15	1184.20	706.19	0.82
Dead+Wind 240 deg+Ice+Temp	85.38	-10.17	5.84	688.11	1204.07	0.19
Dead+Wind 270 deg+Ice+Temp	85.38	-11.77	-0.05	12.58	1388.38	-0.48
Dead+Wind 300 deg+Ice+Temp	85.38	-10.20	-5.94	-664.57	1209.14	-0.88
Dead+Wind 330 deg+Ice+Temp	85.38	-5.93	-10.21	-1153.32	719.64	-1.12
Dead+Wind 0 deg - Service	43.47	-0.10	-15.20	-1637.52	19.94	-1.18
Dead+Wind 30 deg - Service	43.47	7.52	-13.15	-1414.98	-803.54	-0.95
Dead+Wind 60 deg - Service	43.47	13.15	-7.53	-806.88	-1413.30	-0.29
Dead+Wind 90 deg - Service	43.47	15.23	0.11	19.34	-1640.67	0.45
Dead+Wind 120 deg - Service	43.47	13.22	7.69	835.84	-1424.28	0.89
Dead+Wind 150 deg - Service	43.47	7.69	13.20	1428.39	-828.52	1.11
Dead+Wind 180 deg -	43.47	0.12	15.18	1640.13	-13.26	1.10

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Service						
Dead+Wind 210 deg - Service	43.47	-7.54	13.11	1414.86	816.04	0.94
Dead+Wind 240 deg - Service	43.47	-13.14	7.52	811.60	1422.20	0.29
Dead+Wind 270 deg - Service	43.47	-15.21	-0.08	-9.08	1647.18	-0.45
Dead+Wind 300 deg - Service	43.47	-13.19	-7.70	-831.99	1430.26	-0.82
Dead+Wind 330 deg - Service	43.47	-7.67	-13.20	-1423.99	836.88	-1.11

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-43.47	0.00	-0.00	43.47	0.00	0.003%
2	-0.25	-43.47	-38.92	0.25	43.47	38.91	0.002%
3	19.26	-43.47	-33.65	-19.26	43.47	33.65	0.000%
4	33.66	-43.47	-19.28	-33.66	43.47	19.28	0.000%
5	39.00	-43.47	0.28	-39.00	43.47	-0.28	0.002%
6	33.84	-43.47	19.68	-33.84	43.47	-19.68	0.000%
7	19.68	-43.47	33.78	-19.68	43.47	-33.78	0.000%
8	0.32	-43.47	38.86	-0.32	43.47	-38.86	0.009%
9	-19.29	-43.47	33.55	19.29	43.47	-33.55	0.000%
10	-33.63	-43.47	19.26	33.63	43.47	-19.26	0.000%
11	-38.94	-43.47	-0.20	38.93	43.47	0.20	0.009%
12	-33.77	-43.47	-19.71	33.77	43.47	19.71	0.000%
13	-19.65	-43.47	-33.80	19.65	43.47	33.80	0.000%
14	0.00	-85.38	0.00	-0.00	85.38	0.00	0.001%
15	-0.06	-85.38	-11.77	0.06	85.38	11.77	0.001%
16	5.83	-85.38	-10.18	-5.83	85.38	10.18	0.000%
17	10.18	-85.38	-5.84	-10.18	85.38	5.84	0.000%
18	11.79	-85.38	0.07	-11.79	85.38	-0.07	0.001%
19	10.22	-85.38	5.94	-10.22	85.38	-5.94	0.000%
20	5.94	-85.38	10.21	-5.94	85.38	-10.21	0.000%
21	0.08	-85.38	11.75	-0.08	85.38	-11.75	0.001%
22	-5.84	-85.38	10.15	5.84	85.38	-10.15	0.000%
23	-10.17	-85.38	5.84	10.17	85.38	-5.84	0.000%
24	-11.77	-85.38	-0.05	11.77	85.38	0.05	0.001%
25	-10.20	-85.38	-5.94	10.20	85.38	5.94	0.000%
26	-5.93	-85.38	-10.21	5.93	85.38	10.21	0.000%
27	-0.10	-43.47	-15.20	0.10	43.47	15.20	0.005%
28	7.52	-43.47	-13.15	-7.52	43.47	13.15	0.001%
29	13.15	-43.47	-7.53	-13.15	43.47	7.53	0.001%
30	15.24	-43.47	0.11	-15.23	43.47	-0.11	0.005%
31	13.22	-43.47	7.69	-13.22	43.47	-7.69	0.001%
32	7.69	-43.47	13.20	-7.69	43.47	-13.20	0.001%
33	0.12	-43.47	15.18	-0.12	43.47	-15.18	0.005%
34	-7.54	-43.47	13.11	7.54	43.47	-13.11	0.001%
35	-13.14	-43.47	7.52	13.14	43.47	-7.52	0.001%
36	-15.21	-43.47	-0.08	15.21	43.47	0.08	0.005%
37	-13.19	-43.47	-7.70	13.19	43.47	7.70	0.001%
38	-7.67	-43.47	-13.20	7.67	43.47	13.20	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000995
2	Yes	18	0.00002147	0.00013922

3	Yes	22	0.00000001	0.00011578
4	Yes	22	0.00000001	0.00011986
5	Yes	18	0.00002145	0.00007991
6	Yes	22	0.00000001	0.00012614
7	Yes	22	0.00000001	0.00012150
8	Yes	16	0.00008419	0.00013753
9	Yes	22	0.00000001	0.00012185
10	Yes	22	0.00000001	0.00011822
11	Yes	16	0.00008412	0.00010703
12	Yes	22	0.00000001	0.00012283
13	Yes	22	0.00000001	0.00012656
14	Yes	14	0.00000001	0.00004896
15	Yes	19	0.00004857	0.00009958
16	Yes	20	0.00000001	0.00008753
17	Yes	20	0.00000001	0.00009007
18	Yes	19	0.00004857	0.00009642
19	Yes	20	0.00000001	0.00009801
20	Yes	20	0.00000001	0.00009341
21	Yes	19	0.00004853	0.00010106
22	Yes	20	0.00000001	0.00010333
23	Yes	20	0.00000001	0.00010071
24	Yes	19	0.00004854	0.00010145
25	Yes	20	0.00000001	0.00009817
26	Yes	20	0.00000001	0.00010246
27	Yes	16	0.00009107	0.00010316
28	Yes	19	0.00000001	0.00008093
29	Yes	19	0.00000001	0.00008789
30	Yes	16	0.00009107	0.00006415
31	Yes	19	0.00000001	0.00009479
32	Yes	19	0.00000001	0.00008671
33	Yes	16	0.00009107	0.00007345
34	Yes	19	0.00000001	0.00009237
35	Yes	19	0.00000001	0.00008548
36	Yes	16	0.00009106	0.00005408
37	Yes	19	0.00000001	0.00008901
38	Yes	19	0.00000001	0.00009623

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 150.5	52.924	37	3.0428	0.0097
L2	150.5 - 150	46.889	37	3.0174	0.0085
L3	150 - 119	46.573	37	3.0141	0.0084
L4	119 - 97.1667	28.585	37	2.4090	0.0040
L5	102 - 90.5	20.725	37	1.9942	0.0027
L6	90.5 - 60.5	16.136	37	1.7890	0.0023
L7	60.5 - 55	6.970	37	1.1286	0.0012
L8	55 - 30.5	5.736	37	1.0142	0.0010
L9	30.5 - 0	1.726	37	0.5489	0.0005

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
158.0000	SBNH-1D6565C w/ Mount Pipe	37	51.650	3.0409	0.0097	18597
149.0000	(2) LPA-80063/4CF w/ Mount Pipe	37	45.943	3.0066	0.0085	6591
139.0000	VHLP2.5-11	37	39.777	2.8743	0.0070	3601
135.0000	LLPX310R-V1 w/ Mount Pipe	37	37.396	2.7973	0.0063	3094
126.0000	(3) DB844H90E-XY w/ Mount Pipe	37	32.281	2.5897	0.0051	2350

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
116.0000	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	37	27.088	2.3299	0.0039	2115
106.0000	HBX-6516DS-VTM w/ Mount Pipe	37	22.449	2.0800	0.0031	2709
50.0000	58532A	37	4.715	0.9145	0.0010	3095
47.0000	KS24019-L112A	37	4.148	0.8562	0.0009	2958

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 150.5	134.502	6	7.7417	0.0246
L2	150.5 - 150	119.217	6	7.6777	0.0214
L3	150 - 119	118.417	6	7.6693	0.0211
L4	119 - 97.1667	72.795	6	6.1379	0.0103
L5	102 - 90.5	52.812	6	5.0837	0.0070
L6	90.5 - 60.5	41.133	6	4.5615	0.0058
L7	60.5 - 55	17.782	6	2.8794	0.0030
L8	55 - 30.5	14.635	6	2.5875	0.0027
L9	30.5 - 0	4.405	6	1.4008	0.0013

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
158.0000	SBNH-1D6565C w/ Mount Pipe	6	131.275	7.7370	0.0245	7589
149.0000	(2) LPA-80063/4CF w/ Mount Pipe	6	116.822	7.6504	0.0214	2690
139.0000	VHLP2.5-11	6	101.196	7.3157	0.0173	1465
135.0000	LLPX310R-V1 w/ Mount Pipe	6	95.160	7.1210	0.0157	1257
126.0000	(3) DB844H90E-XY w/ Mount Pipe	6	82.182	6.5959	0.0125	951
116.0000	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	6	68.991	5.9372	0.0096	852
106.0000	HBX-6516DS-VTM w/ Mount Pipe	6	57.198	5.3020	0.0076	1084
50.0000	58532A	6	12.030	2.3335	0.0025	1218
47.0000	KS24019-L112A	6	10.584	2.1849	0.0023	1164

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	160 - 150.5 (1)	TP20x20x0.25	9.5000	0.0000	0.0	21.000	15.5116	-2.42	325.74	0.007
L2	150.5 - 150 (2)	TP20.3x20x0.25	0.5000	0.0000	0.0	21.000	15.7472	-2.45	330.69	0.007
L3	150 - 119 (3)	TP26.6545x20.3x0.25	31.0000	0.0000	0.0	39.000	21.2556	-8.34	828.97	0.010
L4	119 - 97.1667 (4)	TP31.13x26.6545x0.3512	21.8333	0.0000	0.0	37.758	33.6862	-12.29	1271.92	0.010
L5	97.1667 - 90.5	TP31.9973x29.4368x0.472	11.5000	0.0000	0.0	37.806	47.9115	-15.14	1811.34	0.008

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
	(5)									
L6	90.5 - 60.5 (6)	TP38.149x31.9973x0.4827	30.0000	0.0000	0.0	37.722	58.5468	-22.24	2208.50	0.010
L7	60.5 - 55 (7)	TP39.2768x38.149x0.5056	5.5000	0.0000	0.0	39.000	63.1157	-23.73	2461.51	0.010
L8	55 - 30.5 (8)	TP43.5485x39.2768x0.555 3	24.5000	0.0000	0.0	39.000	76.8774	-32.89	2998.22	0.011
L9	30.5 - 0 (9)	TP49.8x43.5485x0.5594	30.5000	0.0000	0.0	39.000	88.6924	-43.45	3459.00	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	160 - 150.5 (1)	TP20x20x0.25	45.45	7.205	23.100	0.312	0.00	0.000	23.100	0.000
L2	150.5 - 150 (2)	TP20.3x20x0.25	48.55	7.468	23.100	0.323	0.00	0.000	23.100	0.000
L3	150 - 119 (3)	TP26.6545x20.3x0.25	509.88	44.662	39.000	1.145	0.00	0.000	39.000	0.000
L4	119 - 97.1667 (4)	TP31.13x26.6545x0.3512	905.56	44.467	37.758	1.178	0.00	0.000	37.758	0.000
L5	97.1667 - 90.5 (5)	TP31.9973x29.4368x0.47 2	1206.7 5	39.491	37.806	1.045	0.00	0.000	37.806	0.000
L6	90.5 - 60.5 (6)	TP38.149x31.9973x0.482 7	2076.1 4	46.436	37.722	1.231	0.00	0.000	37.722	0.000
L7	60.5 - 55 (7)	TP39.2768x38.149x0.505 6	2248.7 7	45.337	39.000	1.162	0.00	0.000	39.000	0.000
L8	55 - 30.5 (8)	TP43.5485x39.2768x0.55 53	3083.0 1	46.012	39.000	1.180	0.00	0.000	39.000	0.000
L9	30.5 - 0 (9)	TP49.8x43.5485x0.5594	4224.3 0	47.640	39.000	1.222	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	160 - 150.5 (1)	TP20x20x0.25	6.19	0.399	14.000	0.057	0.91	0.072	14.000	0.005
L2	150.5 - 150 (2)	TP20.3x20x0.25	6.24	0.396	14.000	0.057	0.92	0.070	14.000	0.005
L3	150 - 119 (3)	TP26.6545x20.3x0.25	20.35	0.957	26.000	0.075	0.80	0.033	26.000	0.001
L4	119 - 97.1667 (4)	TP31.13x26.6545x0.3512	25.35	0.753	25.172	0.061	1.14	0.026	25.172	0.001
L5	97.1667 - 90.5 (5)	TP31.9973x29.4368x0.47 2	27.03	0.564	25.204	0.045	1.25	0.019	25.204	0.001
L6	90.5 - 60.5 (6)	TP38.149x31.9973x0.482 7	31.07	0.531	25.148	0.043	1.57	0.017	25.148	0.001
L7	60.5 - 55 (7)	TP39.2768x38.149x0.505 6	31.78	0.503	26.000	0.039	1.63	0.015	26.000	0.001
L8	55 - 30.5 (8)	TP43.5485x39.2768x0.55 53	35.79	0.465	26.000	0.036	1.90	0.013	26.000	0.001
L9	30.5 - 0 (9)	TP49.8x43.5485x0.5594	39.17	0.442	26.000	0.035	2.25	0.012	26.000	0.000

Pole Interaction Design Data

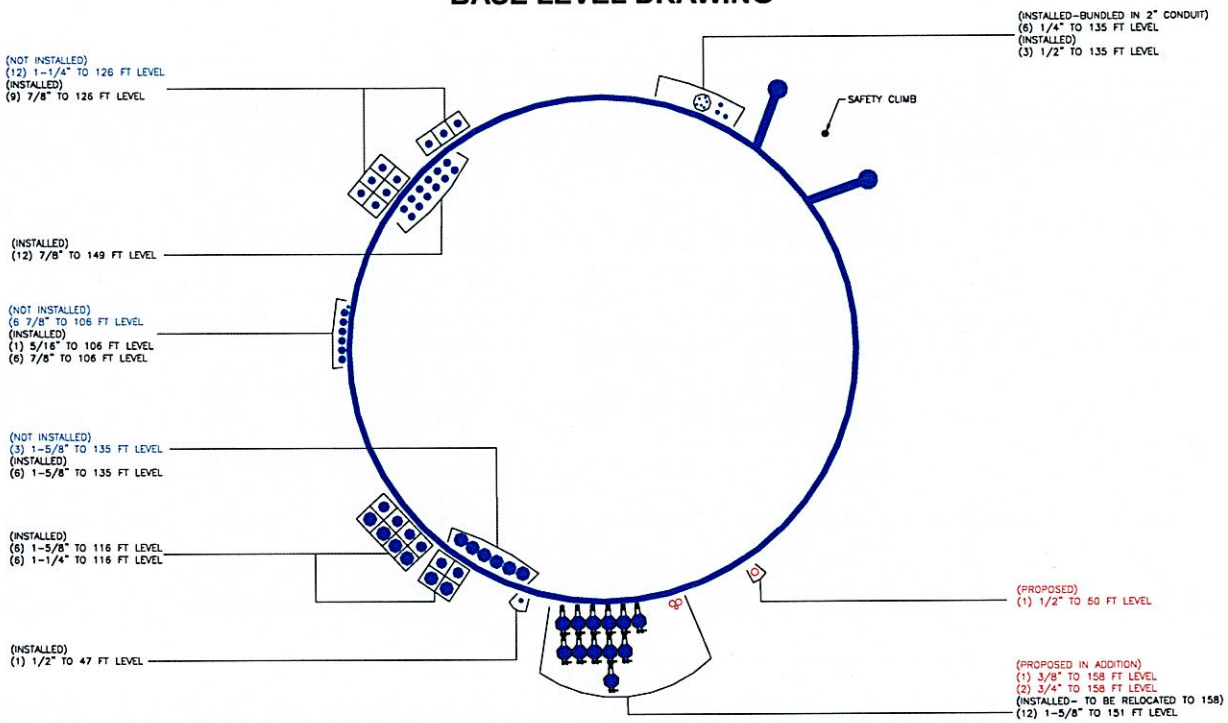
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	160 - 150.5 (1)	0.007	0.312	0.000	0.057	0.005	0.320 ✓	1.333	H1-3+VT ✓
L2	150.5 - 150 (2)	0.007	0.323	0.000	0.057	0.005	0.332 ✓	1.333	H1-3+VT ✓
L3	150 - 119 (3)	0.010	1.145	0.000	0.075	0.001	1.157 ✓	1.333	H1-3+VT ✓
L4	119 - 97.1667 (4)	0.010	1.178	0.000	0.061	0.001	1.188 ✓	1.333	H1-3+VT ✓
L5	97.1667 - 90.5 (5)	0.008	1.045	0.000	0.045	0.001	1.053 ✓	1.333	H1-3+VT ✓
L6	90.5 - 60.5 (6)	0.010	1.231	0.000	0.043	0.001	1.242 ✓	1.333	H1-3+VT ✓
L7	60.5 - 55 (7)	0.010	1.162	0.000	0.039	0.001	1.173 ✓	1.333	H1-3+VT ✓
L8	55 - 30.5 (8)	0.011	1.180	0.000	0.036	0.001	1.191 ✓	1.333	H1-3+VT ✓
L9	30.5 - 0 (9)	0.013	1.222	0.000	0.035	0.000	1.234 ✓	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	160 - 150.5	Pole	TP20x20x0.25	1	-2.42	434.22	24.0	Pass
L2	150.5 - 150	Pole	TP20.3x20x0.25	2	-2.45	440.81	24.9	Pass
L3	150 - 119	Pole	TP26.6545x20.3x0.25	3	-8.34	1105.02	86.8	Pass
L4	119 - 97.1667	Pole	TP31.13x26.6545x0.3512	4	-12.29	1695.47	89.1	Pass
L5	97.1667 - 90.5	Pole	TP31.9973x29.4368x0.472	5	-15.14	2414.52	79.0	Pass
L6	90.5 - 60.5	Pole	TP38.149x31.9973x0.4827	6	-22.24	2943.93	93.1	Pass
L7	60.5 - 55	Pole	TP39.2768x38.149x0.5056	7	-23.73	3281.19	88.0	Pass
L8	55 - 30.5	Pole	TP43.5485x39.2768x0.5553	8	-32.89	3996.63	89.4	Pass
L9	30.5 - 0	Pole	TP49.8x43.5485x0.5594	9	-43.45	4610.85	92.6	Pass
							Summary	
						Pole (L6)	93.1	Pass
						RATING =	**93.1**	**Pass**

APPENDIX B

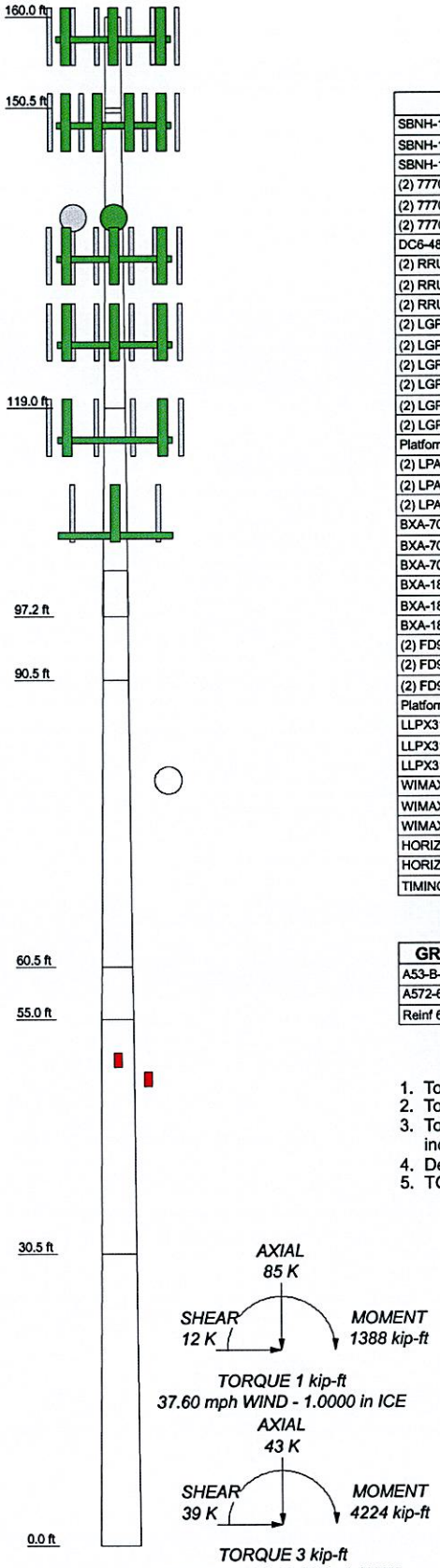
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9
Length (ft)	9.5000	0.5000	31.0000	21.8333	11.5000	30.0000	5.5000	24.5000	30.5000
Number of Sides	1	1	12	12	12	12	12	12	12
Thickness (in)	0.2500	0.2500	0.2500	0.3512	0.4720	0.4827	0.5056	0.5553	0.5594
Socket Length (ft)				4.8333					
Top Dia (in)	20.0000	20.0000	20.3000	26.6545	29.4368	31.9973	38.1490	39.2768	43.5485
Bot Dia (in)	20.0000	20.3000	26.6545	31.1300	31.9973	38.1490	39.2768	43.5485	49.8000
Grade	A53-B-35			A572-65	Reinf 62.93 ksi	Reinf 63.01 ksi	Reinf 62.87 ksi	Reinf 65.00 ksi	
Weight (K)	0.5	0.0	2.0	2.4	1.8	5.5	1.2	6.1	8.6



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
SBNH-1D6565C w/ Mount Pipe	158	(2) DB980H90E-M w/ Mount Pipe	135
SBNH-1D6565C w/ Mount Pipe	158	(2) DB980H90E-M w/ Mount Pipe	135
SBNH-1D6565C w/ Mount Pipe	158	(2) DB980H90E-M w/ Mount Pipe	135
(2) 7770.00 w/ Mount Pipe	158	Platform Mount [LP 602-1]	135
(2) 7770.00 w/ Mount Pipe	158	VHLP2.5-11	135
(2) 7770.00 w/ Mount Pipe	158	VHLP2.5-11	135
DC6-48-60-18-8F	158	(3) DB844H90E-XY w/ Mount Pipe	126
(2) RRUS-11	158	T-Arm Mount [TA 901-3]	126
(2) RRUS-11	158	(3) DB844H90E-XY w/ Mount Pipe	126
(2) RRUS-11	158	(3) DB844H90E-XY w/ Mount Pipe	126
(2) LGP13519	158	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	116
(2) LGP13519	158		
(2) LGP13519	158	RR90-17-02DP w/ Mount Pipe	116
(2) LGP21401	158	RR90-17-02DP w/ Mount Pipe	116
(2) LGP21401	158	RR90-17-02DP w/ Mount Pipe	116
(2) LGP21401	158	KRY 112 71/1	116
Platform Mount [LP 301-1]	158	KRY 112 71/1	116
(2) LPA-80063/4CF w/ Mount Pipe	149	KRY 112 71/1	116
(2) LPA-80080/4CF w/ Mount Pipe	149	ONEBASE TWIN DUAL DUPLEX TMA	116
(2) LPA-80080/4CF w/ Mount Pipe	149	ONEBASE TWIN DUAL DUPLEX TMA	116
BXA-70063/6CFx6 w/ Mount Pipe	149	ONEBASE TWIN DUAL DUPLEX TMA	116
BXA-70063/6CFx4 w/ Mount Pipe	149	Side Arm Mount [SO 103-3]	116
BXA-70063/6CFx4 w/ Mount Pipe	149	Side Arm Mount [SO 701-3]	116
BXA-185063/8CF w/ Mount Pipe	149	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	116
BXA-185090/8CFx2 w/ Mount Pipe	149	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe	116
BXA-185090/8CFx2 w/ Mount Pipe	149		
(2) FD9R6004/2C-3L	149	HBX-6516DS-VTM w/ Mount Pipe	106
(2) FD9R6004/2C-3L	149	ATM200-A20	106
(2) FD9R6004/2C-3L	149	ATM200-A20	106
Platform Mount [LP 602-1]	149	ATM200-A20	106
LLPX310R-V1 w/ Mount Pipe	135	T-Arm Mount [TA 602-3]	106
LLPX310R-V1 w/ Mount Pipe	135	HBX-6516DS-VTM w/ Mount Pipe	106
LLPX310R-V1 w/ Mount Pipe	135	HBX-6516DS-VTM w/ Mount Pipe	106
WIMAX DAP HEAD	135	58532A	50
WIMAX DAP HEAD	135	Platform Mount [LP 301-1]	50
WIMAX DAP HEAD	135	KS24019-L112A	47
HORIZON COMPACT	135	Side Arm Mount [SO 701-1]	47
HORIZON COMPACT	135		
TIMING 2000	135		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	Reinf 63.01 ksi	63 ksi	79 ksi
A572-65	65 ksi	80 ksi	Reinf 62.87 ksi	63 ksi	79 ksi
Reinf 62.93 ksi	63 ksi	79 ksi	Reinf 65.00 ksi	65 ksi	65 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80.00 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.60 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50.00 mph wind.
5. TOWER RATING: 93.1%

Paul J. Ford and Company
250 East Broad Street, Suite 1500
Columbus, Ohio 43215
Phone: (614) 221-6679
FAX: (614) 448-4118

Job: *160' Monopole / HRT 101 943232*		
Project: *PJF 37512-1571 BP / BU 806373*		
Client: Crown Castle	Drawn by: Kyle Thorpe	App'd:
Code: TIA/EIA-222-F	Date: 07/25/12	Scale: NTS
Path:		Dwg No. E-1

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708

Page	1	of	1
By	KAT	Date	7/24/2012
Project	37512-1571 BP		
Client	Crown Castle		
PROJ#	806373		

Stilt Extension Connection

@ 150 ' elevation

Assume 3 legs w/ 22.54 " Channel Circle

Revision = F
Unbraced length = 12 in.
K = 1
Top Pole Shaft Diameter = 20.3 in.
Number of Bolt Rows (N) = 6 Even Number
Bolt Spacing (S) = 3
Allowable Stress Increase = 1.33333

Reactions from TNXTower:

Moment = 48.55 k-ft
Axial = 2.45 kips
Shear = 6.24 kips

$I = \frac{N * (B.C.)^2}{8}$

I = 190.5 in^2

My/I = 34.5 kips
Axial/leg = 0.8167 kips

T = 33.6 kips
C = 35.3 kips
M = 74.88 k-in

x = 1.12 in
A = 8.37 in^2
r = 1.16 in
S = 3.99 in^3
Z = 7.59 in^3
I = 11.3 in^4

Using MC10X28.5 Fy = 50 ksi

Available Strength in Axial Compression

Kl/r = 10.34 C_c = 107.00
Kl/rC_c = 0.097
C_A = 0.551 Use Table 3 on page 5-119 of Green Book
F_a = 36.73 ksi $F_a = 4/3*Fy*C_c$
P = 34.46 kips P = T + Axial / #legs
f_a = 4.12 ksi $f_a = P/A$
Ratio = 11.2%

Available Flexural Strength

F_b = 40.00 ksi F_b = 4/3 * 0.6 * Fy
M_b = 24.96 kip*in M_b = Shear * lu / # legs
f_b = 6.26 ksi $f_b = M_b / S$
Ratio = 15.6%

Combined Strength

fa/Fa = 0.11 < 0.15 Use H1-3 of Green Book
Fe' = 1860.559 ksi
Eqn H1-1
Eqn H1-2
Eqn H1-3 0.2685
Ratio = 26.8%

Bolt Check

Tension Force ($T_{applied}$) = 34.46 kips
Eccentricity (e) = 1.12 in.
V_{allow} (Ajax Bolt) = 31.0 kips
T_{allow} (Ajax Bolt) = 12.0 kips
Sum r^2 = 157.5 $in.^2$
Ry (Shear Force) = 5.744 kips
Rx (Tension Force) = 3.027 kips
Stress Ratio = 16.1%

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

v4.1 - Effective 7-3-12

Date: 7/24/2012
PJF Project: 37512-1571 BP CROWN
Client Ref. # BU 806373
Site Name: HRT 101 943232
Description: 151-ft pole w/ 10-ft propsed extension
Owner: CROWN
Engineer: KAT

Asymmetric Anchor Rod Analysis

Moment =	4224	k-ft	TIA Ref.	F	Location =	Base Plate		
Axial =	43.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	39.0	kips	Max Ratio =	95.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	19							

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

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	0.0	58.06	0.00	3.98	183.01	178.48	178.48	0.00	195.00	91.5%
2	2.250	#18J A615 Gr 75	75	100	22.5	58.06	0.00	3.98	179.24	174.72	174.72	0.00	195.00	89.6%
3	2.250	#18J A615 Gr 75	75	100	45.0	58.06	0.00	3.98	177.02	172.49	172.49	0.00	195.00	88.5%
4	2.250	#18J A615 Gr 75	75	100	67.5	58.06	0.00	3.98	177.32	172.79	172.79	0.00	195.00	88.6%
5	2.250	#18J A615 Gr 75	75	100	90.0	58.06	0.00	3.98	179.55	175.03	175.03	0.00	195.00	89.8%
6	2.250	#18J A615 Gr 75	75	100	112.5	58.06	0.00	3.98	182.05	177.53	177.53	0.00	195.00	91.0%
7	2.250	#18J A615 Gr 75	75	100	135.0	58.06	0.00	3.98	183.15	178.62	178.62	0.00	195.00	91.6%
8	2.250	#18J A615 Gr 75	75	100	157.5	58.06	0.00	3.98	182.14	177.61	177.61	0.00	195.00	91.1%
9	2.250	#18J A615 Gr 75	75	100	180.0	58.06	0.00	3.98	179.67	175.15	175.15	0.00	195.00	89.8%
10	2.250	#18J A615 Gr 75	75	100	202.5	58.06	0.00	3.98	177.39	172.86	172.86	0.00	195.00	88.6%
11	2.250	#18J A615 Gr 75	75	100	225.0	58.06	0.00	3.98	176.98	172.45	172.45	0.00	195.00	88.4%
12	2.250	#18J A615 Gr 75	75	100	247.5	58.06	0.00	3.98	179.10	174.57	174.57	0.00	195.00	89.5%
13	2.250	#18J A615 Gr 75	75	100	270.0	58.06	0.00	3.98	182.83	178.30	178.30	0.00	195.00	91.4%
14	2.250	#18J A615 Gr 75	75	100	292.5	58.06	0.00	3.98	186.29	181.76	181.76	0.00	195.00	93.2%
15	2.250	#18J A615 Gr 75	75	100	315.0	58.06	0.00	3.98	187.72	183.19	183.19	0.00	195.00	93.9%
16	2.250	#18J A615 Gr 75	75	100	337.5	58.06	0.00	3.98	186.40	181.88	181.88	0.00	195.00	93.3%
17	2.250	A193 Gr B7	105	125	22.5	63.00	0.00	3.98	194.03	189.51	189.51	0.00	218.68	86.7%
18	2.250	A193 Gr B7	105	125	135.5	63.00	0.00	3.98	198.54	194.02	194.02	0.00	218.68	88.7%
19	2.250	A193 Gr B7	105	125	248.5	63.00	0.00	3.98	194.03	189.51	189.51	0.00	218.68	86.7%
								75.61						

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

TIA Rev F

Site Data

BU#: *806373*
Site Name: *HRT 101 943232*
App #:

Pole Manufacturer:	*Other*

Reactions		
Moment:	3589.1	ft-kips
Axial:	36.2	kips
Shear:	32.8	kips

Reactions modified to account for post-installed anchors

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

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	58.06	in

Anchor Rod Results

Maximum Rod Tension:	183.2 Kips	Rigid
Allowable Tension:	195.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	94.0% Pass	Fty*ASIF

Plate Data		
Diam:	64.06	in
Thick:	2.75	in
Grade:	60	ksi
Single-Rod B-eff:	10.01	in

Base Plate Results

	Flexural Check	Rigid
Base Plate Stress:	38.3 ksi	Service ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	63.9% Pass	Y.L. Length: 29.85

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

n/a

Stiffener Results

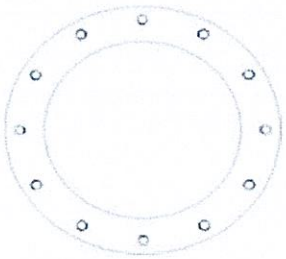
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

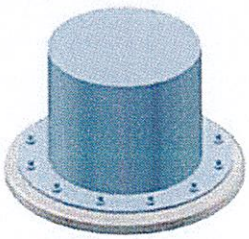
Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	49.8	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	





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

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

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

Job Number: 37512-1571 BP CROWN
Site Number: 806373
Site Name: HRT 101 943232

By: KAT
Date: 7/25/2012

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

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	4224.0		k-ft
Shear, V =	39.0		kips
Axial Load, P =	43.0		kips
OTM =	4263.0	0.0	k-ft @ Ground

Safety Factors / Load Factors / Φ Factors

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

Drilled Pier Parameters

Diameter =	7	ft
Height Above Grade =	1	ft
Depth Below Grade =	24.5	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. ≥ Compression
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 =	36	
Rebar Size =	#11	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#4	
Side Clear Cover to Ties =	3	in

Soil Parameters

Water Table Depth =	5.00	ft
Depth to Ignore Soil =	3.50	ft
Depth to Full Cohesion =	0	ft
Full Cohesion Starts at?	Ground	

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

Direct Embed Pole Shaft Parameters

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

Maximum Capacity Ratios

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

Define Soil Layers

Note: Cohesion = Undrained Shear Strength = 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	3.5	100							3.5
2	0.5	100	0	28	Sand	78000			4
3	1	125	0	42	Sand	78000			5
4	26.5	127.4	0	42	Sand	78000			31.5
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	17.36	ft, from Grade
Bending Moment, M =	4939.86	k-ft, from COR
Resisting Moment, Ma =	5807.48	k-ft, from COR

MOMENT RATIO = 85.1% OK

Shear, V =	39.00	kips
Resisting Shear, Va =	45.85	kips

SHEAR RATIO = 85.1% OK

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	80.30	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, C =	43.00	kips
Allowable Comp. Cap., Ca =	1469.50	kips

COMPRESSION RATIO = 2.9% OK

Steel Results (ACI 318-02):

Minimum Steel Area =	18.47	sq in
Actual Steel Area =	56.16	sq in
Allowable Min Axial, Pa =	-2332.80	kips, Where Ma = 0 k-ft
Allowable Max Axial, Pa =	6943.16	kips, Where Ma = 0 k-ft

Axial Load, P =	78.48	kips @ 5.25 ft Below Grade
Moment, M =	4444.91	k-ft @ 5.25 ft Below Grade
Allowable Moment, Ma =	6570.89	k-ft

MOMENT RATIO = 67.6% OK

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

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

Site Data

BU#: *806373*
Site Name: *HRT 101 943232*
App #:

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

Pier Properties

Concrete:

Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in^2

Reinforcement:

Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	6.30	ft
Vert. Cage Diameter =	75.59	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	36	
As Total=	56.16	in^2
A s/ Aconc, Rho:	0.0101	1.01%

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:	1.01%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	9026.11	kips
at Mu=(ϕ=0.65)Mn=	5472.88	ft-kips
Max Tu, (φ=0.9) Tn =	3032.64	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	4444.91	ft-kips **(* Note)**
Max. Service Shaft P:	78.48	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:	5778.383	ft-kips
1.30	Pu:	102.024	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

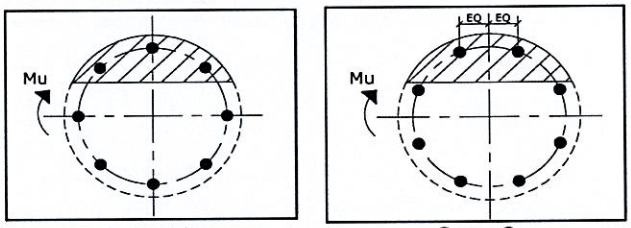
Seismic Properties

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

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

Results:

Governing Orientation Case: **2**



Case 1 Case 2

Dist. From Edge to Neutral Axis:	**17.65**	in
Extreme Steel Strain, εt:	**0.0105**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	102.02	kips
Drilled Shaft Moment Capacity, φMn:	**8542.16**	ft-kips
Drilled Shaft Superimposed Mu:	**5778.38**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**67.6%**

CROWN CASTLE PROJECT: BU #806373; HRT 101 943232; ENFIELD, CT
MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV. 2, 1/22/2009)

UPON THE SUCCESSFUL AND COMPLETE INSTALLATION OF THE REINFORCING SYSTEM SPECIFIED IN THESE PLANS, THE REINFORCED POLE MEETS THE WIND DESIGN RECOMMENDATIONS OF THE TIA/EIA-222-F-1996 STANDARD FOR WIND SPEEDS OF 80 MPH AND 37.6 MPH + 1" RADIAL ICE

A. GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO FABRICATION AND CONSTRUCTION. THESE DRAWINGS WERE PREPARED FROM INFORMATION AND DOCUMENTS PROVIDED TO PAUL J. FORD & COMPANY BY CROWN CASTLE. THIS INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY PAUL J. FORD & COMPANY FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. ANY DISCREPANCIES AND/OR CHANGES BETWEEN THE INFORMATION CONTAINED IN THESE DRAWINGS AND THE ACTUAL VERIFIED SITE CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF CROWN CASTLE AND PAUL J. FORD & COMPANY SO THAT ANY CHANGES AND/OR ADJUSTMENTS, IF NECESSARY, CAN BE MADE TO THE DESIGN AND DRAWINGS.
2. THE EXISTING UNREINFORCED MONOPOLE STRUCTURE DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE ANTENNA AND PLATFORM LOADS SHOWN ON THESE DRAWINGS AT THE REQUIRED MINIMUM TIA/EIA-222-F BASIC WIND SPEEDS. DO NOT INSTALL ANY ADDITIONAL OR NEW ANTENNA AND PLATFORM LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.
3. IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR GREATER QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.
4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN PROPERLY AND ADEQUATELY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO INSURE 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. IMPORTANT CUTTING, WELDING AND SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES FROM CROWN CASTLE. 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 PLAN' (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT".
5. 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 THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES.
6. ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY THE INSPECTION/TESTING AGENCY. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
7. ALL MATERIALS AND EQUIPMENT FURNISHED WILL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO INSURE 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.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.
10. ANY EXISTING ATTACHMENTS AND/OR PROJECTIONS ON THE POLE THAT MAY INTERFERE WITH THE INSTALLATION OF THE REINFORCING SYSTEM WILL HAVE TO BE REMOVED, AND/OR RELOCATED, AND/OR REPLACED AND RE-INSTALLED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH THE OWNER, TESTING AGENCY, AND ENGINEER.
11. ANY AND ALL EXISTING PLATFORMS THAT ARE LOCATED IN AREAS OF THE POLE SHAFT WHERE SHAFT REINFORCING MUST BE APPLIED SHALL BE TEMPORARILY REMOVED OR OTHERWISE SUPPORTED TO PERMIT NEW CONTINUOUS REINFORCEMENT TO BE ATTACHED. AFTER THE CONTRACTOR HAS SUCCESSFULLY INSTALLED THE MONOPOLE REINFORCEMENT SYSTEM, THE CONTRACTOR SHALL RE-INSTALL THE PLATFORMS. IN NO CASE SHALL ANY NEW AND/OR ADDITIONAL PLATFORMS AND/OR ANTENNAS AND/OR COAX CABLES AND/OR OTHER EQUIPMENT BE INSTALLED ON THE MONOPOLE UNTIL THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF ALL OF THE REQUIRED STRUCTURAL REINFORCING SYSTEM COMPONENTS.

B. "LOW HEAT" WELDING PROCEDURES - (NOT REQUIRED)

C. SPECIAL INSPECTION AND TESTING

1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY THE OWNER'S REPRESENTATIVE AND THE OWNER'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY. REFER TO CROWN CASTLE DOCUMENT ENG-SOW-10066 FOR SPECIFICATION.
1. ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE PERFORMED SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
2. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
3. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED, RETAINED AND PAID FOR BY THE OWNER FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.
   - (A.) ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.
   - (B.) 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.
4. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES FOR THE OWNER. THE TESTING AGENCY SHALL 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.

A. GENERAL:
   - (1.) PERFORM CONTINUOUS ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY OWNER IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.

B. FOUNDATIONS, CONCRETE, AND SOIL PREPARATION - (NOT REQUIRED)

C. CONCRETE TESTING PER ACI - (NOT REQUIRED)

D. STRUCTURAL STEEL
   - (1.) CHECK THE STEEL ON THE JOB WITH THE PLANS.
   - (2.) CHECK MILL CERTIFICATIONS.
   - (3.) CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.
   - (4.) INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES
   - (5.) CALL FOR LABORATORY TEST REPORTS WHEN IN DOUBT.
   - (6.) CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.
   - (7.) CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.
   - (8.) CHECK BOLT TIGHTENING ACCORDING TO AISC "TURN OF THE NUT" METHOD.

E. WELDING:
   - (1.) VERIFY FIELD WELDING PROCEDURES, WELDERS, AND WELDING OPERATORS, NOT DEEMED PREQUALIFIED, IN ACCORDANCE WITH AWS D1.1.
   - (2.) INSPECT FIELD WELDED CONNECTIONS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED AND IN ACCORDANCE WITH AWS D1.1.
   - (3.) APPROVE FIELD WELDING SEQUENCE.
     - (A.) A PROGRAM OF THE APPROVED SEQUENCES SHALL BE SUBMITTED TO THE OWNER BEFORE WELDING BEGINS. NO CHANGE IN APPROVED SEQUENCES MAY BE MADE WITHOUT PERMISSION FROM THE OWNER.
   - (4.) INSPECT WELDED CONNECTIONS AS FOLLOWS AND IN ACCORDANCE WITH AWS D1.1:
     - (A.) INSPECT WELDING EQUIPMENT FOR CAPACITY, MAINTENANCE AND WORKING CONDITIONS.
     - (B.) VERIFY SPECIFIED ELECTRODES AND HANDLING AND STORAGE OF ELECTRODES FOR CONFORMANCE TO SPECIFICATIONS.
     - (C.) INSPECT PREHEATING AND INTERPASS TEMPERATURES FOR CONFORMANCE WITH AWS D1.1.
     - (D.) VISUALLY INSPECT ALL WELDS AND VERIFY THAT QUALITY OF WELDS MEETS THE REQUIREMENTS OF AWS D1.1.
     - (E.) SPOT TEST AT LEAST ONE FILLET WELD OF EACH MEMBER USING MAGNETIC PARTICLE OR DYE PENETRANT.
     - (F.) INSPECT FOR SIZE, SPACING, TYPE AND LOCATION AS PER APPROVED PLANS.
     - (G.) VERIFY THAT THE BASE METAL CONFORMS TO THE DRAWINGS.
     - (H.) REVIEW THE REPORTS BY TESTING LABS.
     - (I.) CHECK TO SEE THAT WELDS ARE CLEAN AND FREE FROM SLAG.
     - (J.) INSPECT RUST PROTECTION OF WELDS AS PER SPECIFICATIONS.
     - (K.) CHECK THAT DEFECTIVE WELDS ARE CLEARLY MARKED AND HAVE BEEN ADEQUATELY REPAIRED.

F. SPECIAL INSPECTION OF EXISTING SHAFT-TO-FLANGE WELD CONNECTIONS:
   - (1.) PRIOR TO CONSTRUCTION, TESTING AGENCY SHALL INSPECT CONDITION OF EXISTING SHAFT-TO-BASE-PLATE WELD CONNECTION. ALSO INSPECT EXISTING STIFFENERS IF PRESENT. THE INSPECTOR SHALL USE THE FOLLOWING INSPECTION METHODS, OR COMBINATION OF METHODS, AS REQUIRED TO IDENTIFY ANY CRACKS: VISUAL, MAGNETIC PARTICLE, AND/OR ULTRA-SONIC. IN ADDITION, OTHER TEST METHODS MAY ALSO BE USED AT THE RECOMMENDATION OF THE TESTING AGENCY AND UPON THE APPROVAL OF THE OWNER AND THE ENGINEER. THE TESTING AGENCY SHALL PROVIDE CAREFUL AND THOROUGH DOCUMENTATION OF THIS INSPECTION TO THE OWNER AND THE ENGINEER. TESTING AGENCY SHALL COORDINATE THESE INSPECTION ACTIVITIES WITH THE OWNER'S REQUIRED PROCESSES AND PROCEDURES. IMPORTANT: THE TESTING AGENCY SHALL IMMEDIATELY REPORT ANY INDICATIONS OF CRACKS, FRACTURES, DISTRESS, AND/OR CORROSION TO THE OWNER AND ENGINEER.
   - (2.) AFTER CONSTRUCTION, TESTING AGENCY SHALL INSPECT ANY AND ALL FIELD REPAIRS IMPLEMENTED AS REQUIRED BY THE OWNER FROM THE RESULTS OF THE INSPECTION IN THE PREVIOUS NOTE 5.F.(1.) ABOVE.
   - (3.) REFER TO CROWN CASTLE DOCUMENTS ENG-SOW-10033 AND ENG-BUL-10051 FOR SPECIFICATIONS.

G. REPORTS:
   - (1.) COMPILE AND PERIODICALLY SUBMIT DAILY INSPECTION REPORTS TO THE OWNER.

6. 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 AND PROBLEMS SHALL BE BROUGHT IMMEDIATELY TO THE OWNER'S ATTENTION. RESOLUTIONS ARE NOT TO BE MADE WITHOUT THE OWNER'S REVIEW AND SPECIFIC WRITTEN CONSENT. THE OWNER RESERVES THE RIGHT TO DETERMINE WHAT IS AN ACCEPTABLE RESOLUTION OF DISCREPANCIES AND PROBLEMS.
7. 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 THE OWNER. THIS WRITTEN ACTION WILL GIVE THE CONTRACTOR A LIST OF ITEMS TO BE CORRECTED, PRIOR TO CONTINUING CONSTRUCTION, AND/OR LOADING OF STRUCTURAL ITEMS.
8. RESPONSIBILITY: 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.

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED
PROFESSIONAL ENGINEER

JUL 2 6 2012

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 1500 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

CROWN CASTLE
THE PIANO WORKS349 WEST, EAST ROCHESTER, NY 14445
PH: (585) 899-3445 FAX: (585) 899-3448

BU #806373; HRT 101 943232
ENFIELD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37512-1571	ISSUE DATE OF PERMIT: 7-24-2012
DRAWN BY: S.S.	
CHECKED BY: K.A.T.	
APPROVED BY:	S-1
DATE: 7-24-2012	

37512-1571 PERMIT.DWG

D. **STRUCTURAL STEEL**

1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:

A. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
   - (A.) "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS."
   - (B.) "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS OF THE ENGINEERING FOUNDATION.
   - (C.) "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES" (PARAGRAPH 4.2.1 SPECIFICALLY EXCLUDED).

B. BY THE AMERICAN WELDING SOCIETY (AWS):
   - (A.) "STRUCTURAL WELDING CODE - STEEL D1.1."
   - (B.) "SYMBOLS FOR WELDING AND NON-DESTRUCTIVE TESTING"

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.
3. TIGHTEN ALL STRUCTURAL BOLTS, INCLUDING THE AJAX M20 BOLTS WITH SHEAR SLEEVES, ACCORDING TO THE REQUIREMENTS OF THE AISC "TURN OF THE NUT" METHOD. TIGHTEN BOLTS 1/3 TURN PAST THE SNUG TIGHT CONDITION AS DEFINED BY AISC.
4. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1. ALL WELD ELECTRODES SHALL BE E80XX UNLESS NOTED OTHERWISE ON THE DRAWINGS.
5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO THE OWNER'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65 (FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
7. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION I NOTES REGARDING TOUCH-UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.
8. UNLESS OTHERWISE NOTED, ALL STEEL MEMBERS SHALL BE HOT-DIP GALVANIZED, AFTER FABRICATION, IN ACCORDANCE WITH ASTM A123. SEE SECTION J FOR FURTHER NOTES AND FOR EXCEPTIONS (IF ANY).
9. ALL WELDS SHALL BE VISUALLY INSPECTED BY THE OWNER'S APPROVED TESTING AGENCY. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT. THE CONTRACTOR SHALL COOPERATE WITH THE TESTING AGENCY IN THEIR TESTING EFFORTS.
10. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
11. FIELD CUTTING OF STEEL:
   - (A.) PRIOR TO ANY FIELD CUTTING, THE CONTRACTOR SHALL MARK THE CUT OUTLINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS.
   - (B.) ANY REQUIRED CUTS IN THE STEEL SHALL BE CAREFULLY CUT BY MECHANICAL METHODS SUCH AS DRILLING, SAW CUTTING, AND GRINDING. THE CONTRACTOR IS RESPONSIBLE TO PREVENT ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, DURING THE CUTTING WORK. 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.
   - (C.) 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. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.

E. **BASE PLATE GROUT**

1. NEW GROUT FOR THE POLE BASE SHALL BE NON-SHRINK, NON-METALLIC, GROUT (EUCO NS GROUT BY EUCLID, OR APPROVED EQUAL) WITH A 7500 PSI MINIMUM COMPRESSIVE STRENGTH. PVC DRAINAGE PIPES SHALL BE PROVIDED FROM INSIDE THE POLE SHAFT OUT THROUGH THE GROUT SPACE UNDER THE BASE PLATE IN ORDER TO ALLOW MOISTURE TO ADEQUATELY DRAIN FROM THE INTERIOR OF THE POLE SHAFT. CONTRACTOR SHALL SUBMIT PROPOSED GROUT SPECIFICATION INFORMATION TO THE OWNER FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION. CONTRACTOR SHALL FOLLOW GROUT MANUFACTURER'S SPECIFICATIONS FOR COLD WEATHER GROUTING PROCEDURES (IF NECESSARY) AND THE TESTING AGENCY SHALL PREPARE GROUT SAMPLE SPECIMENS FOR COMPRESSIVE STRENGTH TESTING AND VERIFICATION.
2. GROUT SHALL BE INSTALLED TIGHT UNDER BASE PLATE WITH NO VOIDS REMAINING BETWEEN TOP OF EXISTING CONCRETE AND UNDERSIDE OF EXISTING BASE PLATE (EXCEPT FOR DRAIN PIPES). GROUT COMPLETELY SOLID (EXCEPT FOR DRAIN PIPES) UNDER ENTIRE SURFACE OF BASE PLATE FROM OUTSIDE EDGE TO INSIDE EDGE.

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

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

H. **EPOXY GROUTED REINFORCING ANCHOR RODS**

1. UNLESS OTHERWISE NOTED, REINFORCING ANCHOR RODS SHALL BE 150 KSI ALL-THREAD BAR CONFORMING TO ASTM A722. RECOMMENDED MANUFACTURERS/SUPPLIERS OF 150 KSI ALL-THREAD BAR ARE WILLIAMS FORM ENGINEERING CORPORATION AND DYWIDAG SYSTEMS INTERNATIONAL.
2. ALL REINFORCING ANCHOR RODS SHALL BE HOT DIP GALVANIZED PER ASTM A153. ALTERNATIVELY, ALL REINFORCING ANCHOR RODS MAY BE EPOXY COATED PER ASTM A775.
3. THE CORE-DRILLED HOLES IN THE CONCRETE FOR THE ANCHOR RODS SHALL BE CLEAN AND DRY, AND OTHERWISE PROPERLY PREPARED ACCORDING TO THE ANCHOR ROD AND EPOXY MANUFACTURERS' INSTRUCTIONS, PRIOR TO PLACEMENT OF ANCHOR RODS AND EPOXY. CONTRACTOR SHALL FOLLOW ALL ANCHOR ROD AND EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF RODS, EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST-INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.
4. ULTRABOND 1, HILTI HIT RE-500 OR ANCHORTITE EPOXY SHALL BE USED TO ANCHOR THE 150 KSI ALL-THREAD BAR IN THE DRILL HOLES. IF CONTRACTOR WISHES TO USE A DIFFERENT EPOXY, A REQUEST INCLUDING THE EPOXY TECHNICAL DATA SHEET(S) SHALL BE SUBMITTED TO PAUL J FORD AND COMPANY FOR REVIEW PRIOR TO CONSTRUCTION. AS NOTED ABOVE, FOLLOW ALL EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST-INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.
5. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN INSTALLED AND ALL EPOXY AND GROUT HAVE CURED (IF BASE PLATE AND/OR BEARING PLATES HAVE BEEN GROUTED PRIOR TO TESTING), ALL REINFORCING ANCHOR RODS SHALL BE LOAD TESTED PER CROWN CASTLE ENGINEERING DOCUMENT #ENG-PRC-10119. REFER TO THE NEW ANCHOR & BRACKET DETAIL ON FOLLOWING DRAWING SHEETS FOR SPECIFIED ANCHOR ROD PROOF LOAD.
6. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN SUCCESSFULLY LOAD TESTED AND APPROVED AND BASE PLATE / BEARING PLATE GROUT HAS CURED (IF BASE PLATE AND/OR BEARING PLATES HAVE BEEN GROUTED AFTER TESTING), CONTRACTOR SHALL TIGHTEN ALL HEAVY HEX ANCHOR NUTS TO SNUG TIGHT PLUS 1/8 TURN OF NUT.

I. **TOUCH UP OF GALVANIZING**

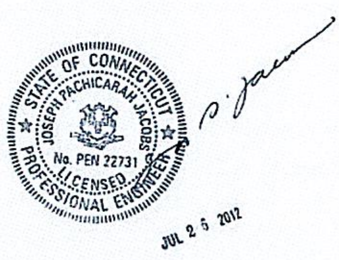
1. THE CONTRACTOR SHALL TOUCH UP ANY AND/OR ALL AREAS OF GALVANIZING ON THE EXISTING STRUCTURE OR NEW COMPONENTS THAT ARE DAMAGED OR ABRADED DURING CONSTRUCTION. **GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS ANY AND ALL ABRASIONS, CUTS, FIELD DRILLING, AND ALL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

J. **HOT DIP GALVANIZING**

1. HOT-DIP GALVANIZE ALL STRUCTURAL STEEL MEMBERS AND ALL STEEL ACCESSORIES, BOLTS, WASHERS, ETC. PER ASTM A123 OR PER ASTM A153, AS APPROPRIATE.
2. PROPERLY PREPARE STEEL ITEMS FOR GALVANIZING.
3. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES AS REQUIRED.
4. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

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

1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY THE OWNER, THE OWNER WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.
2. THE MONOPOLE REINFORCING SYSTEM INDICATED IN THESE DOCUMENTS USES REINFORCING COMPONENTS THAT INVOLVE FIELD WELDING STEEL MEMBERS TO THE EXISTING GALVANIZED STEEL POLE STRUCTURE. THESE 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 CONNECTED 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 THE OWNER REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.**
3. THE OWNER SHALL REFER TO TIA/EIA-222-F-1996, SECTION 14 AND ANNEX E FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY THE OWNER BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. **PAUL J. FORD & COMPANY RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT.** ACCORDING TO TIA/EIA-222-F-1996 SECTION 14.1, NOTE 1: "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".



PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 1500 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

CROWN CASTLE
THE PIANO WORKS349 WEST, EAST ROCHESTER, NY 14445
PH: (585) 899-3445 FAX: (585) 899-3449

BU #806373; HRT 101 943232
ENFIELD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37512-1571
DRAWN BY: S.S.
CHECKED BY: K.A.T.
APPROVED BY:
DATE: 7-24-2012

ISSUE DATE OF PERMIT: 7-24-2012

S-2

AJAX BOLT NOTE SHEET: REV. 1.2, 01-23-2012

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 SILICONE 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.
1413 ROCKINGHAM ROAD BELLOWS FALLS, VERMONT, USA 05101
PHONE 1-800-552-1999
WEBSITE: WWW.APPLIEDBOLTING.COM

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

DTI: USE DIRECT TENSION INDICATOR (DTI) WASHERS COMPATIBLE WITH 3/4" 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.

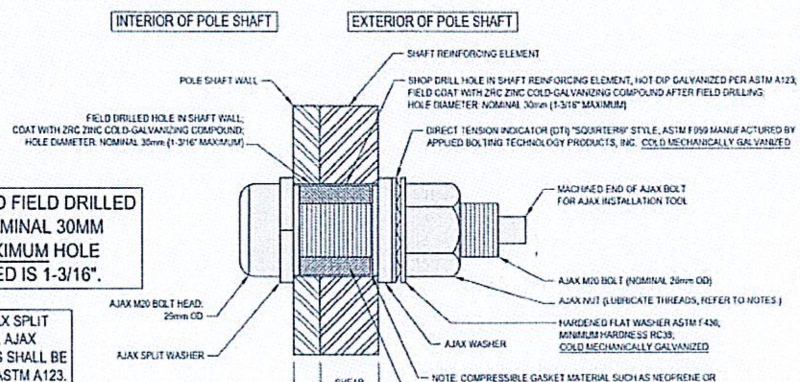
HARDENED WASHERS REQUIRED: USE A HARDENED WASHER FOR A 3/4" NOMINAL BOLT BETWEEN THE TOP OF THE DIRECT TENSION INDICATOR (DTI) WASHER AND THE NUT OF THE AJAX M20 BOLTS. HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A MINIMUM HARDNESS OF RC 38 OR HIGHER. THE HARDENED WASHERS SHALL BE MECHANICALLY 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.

TYPICAL AJAX BOLT DETAIL (1 / S-3)

STATE OF CONNECTICUT JOSEPH PACHICARAN JACOBS No. PEN 22731 LICENSED PROFESSIONAL ENGINEER

JUL 2 6 2012

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 1500 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

CROWN CASTLE
THE PIANO WORKS349 WEST, EAST ROCHESTER, NY 14445
PH: (585) 899-3445 FAX: (585) 899-3448

BU #806373; HRT 101 943232
ENFIELD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37512-1571	ISSUE DATE OF PERMIT: 7-24-2012
DRAWN BY: S.S.	
CHECKED BY: K.A.T.	
APPROVED BY:	S-3
DATE: 7-24-2012	

37512-1571 PERMIT.DWG

NOTE: NO DETAILED INFORMATION REGARDING INTERFERENCES WAS PROVIDED. THEREFORE, CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO PAUL J. FORD AND COMPANY AND CROWN CASTLE FIELD PERSONNEL IMMEDIATELY.

THIS POLE REINFORCEMENT DRAWING IS FOR THE POLE DESIGN AND ANTENNA LOADING DOCUMENTED IN THE PJF CO-LOCATION ANALYSIS FOR THIS SITE (PJF#37512-1571), DATED 7-24-2012.

POLE SPECIFICATIONS	
POLE SHAPE TYPE:	12-SIDED POLYGON; ROUND
TAPER:	0.2710657 IN/FT
SHAFT STEEL:	ASTM A572 GRADE 65
BASE PL STEEL:	ASTM A633 GR. E (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	10.00	0.2500		20.000	20.000
2	52.83	0.2500	58.00	20.360	31.130
3	52.92	0.3750	71.00	29.639	40.490
4	55.00	0.4380		38.527	49.800

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.

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 ON SHEET S-3 FOR THE USE OF DIRECT TENSION INDICATOR (DTI) WASHERS WITH THE AJAX M20 BOLTS.

4. DTI'S REQUIRED: * 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.

5. 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. REFER TO SHEET S-3.

6. AJAX BOLT HOLE SIZE: ALL SHOP- AND FIELD-DRILLED HOLES SHALL BE NOMINAL 30MM DIAMETER. THE MAXIMUM HOLE DIAMETER PERMITTED IS 1-3/16". REFER TO SHEET S-3.

* AS OF 9/30/2012, UNTIL FURTHER NOTICE, CROWN CASTLE WILL ACCEPT AJAX BOLTS TIGHTENED USING AISC "TURN-OF-THE-NUT" METHODOLOGY. INSTALLERS SHALL FOLLOW CROWN GUIDELINES FOR AISC "TURN-OF-THE-NUT" METHOD AND ALSO PROVIDE COMPLETE INSPECTION DOCUMENTATION IN THE PMI.

NDE OF THE CIRCUMFERENTIAL WELD OF THE BASE PLATE TO SHAFT CONNECTION IS REQUIRED. PLEASE SEE ENG-SOW-1033 : TOWER BASE PLATE NDE AND ENG-BUL-10051 : NDE REQUIREMENTS FOR MONOPOLE BASE PLATE TO PREVENT CONNECTION FAILURE. NOTIFY THE EOR AND CROWN ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING REINFORCEMENTS THAT HAVE BEEN WELDED TO THE BASE PLATE. FULL PENETRATION WELDING TO THE BASE PLATE REQUIRED AS PART OF THIS ACTIVE REINFORCEMENT DESIGN SHALL BE INCLUDED IN THE NDE SCOPE OF WORK.

NEW AEROSOLUTIONS MP3 REINFORCING (OPTION #1)

ELEVATION	FLAT #	NO. OF END BOLTS (PER END)	INTERMEDIATE BOLT SPACING	MP3
0'-6" TO 30'-6"	1, 5 & 9	13	24"	MP306
30'-6" TO 60'-6"	1, 5 & 9	9	18"	MP305
60'-6" TO 90'-6"	1, 5 & 9	9	16"	MP305
90'-6" TO 120'-6"	1, 5 & 9	6	18"	MP304

ALL BOLTS SHALL BE AJAX M20 BOLTS WITH HIGH STRENGTH SHEAR SLEEVES (ASTM A519 WITH MIN Fu=105 KSI). CONTACT SUPPLIER FOR MATERIAL (PLATE & BOLTS) AND INSTALLATION PROCEDURES

NEW SABRE FLAT PLATE REINFORCING (OPTION #2)

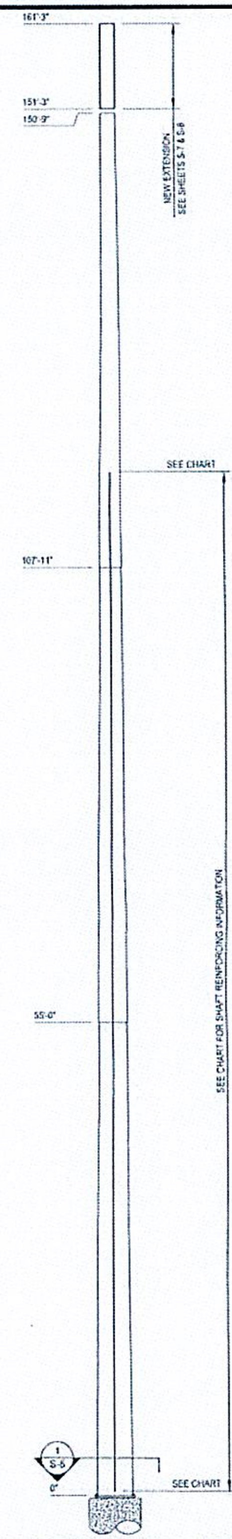
ELEVATION	FLAT #	NO. OF END BOLTS (PER END)	INTERMEDIATE BOLT SPACING	FLAT PLATE
0'-6" TO 30'-6"	1, 5 & 9	15	17 1/4"	MS-850
30'-6" TO 60'-6"	1, 5 & 9	11	19 1/4"	MS-650
60'-6" TO 90'-6"	1, 5 & 9	11	19 1/4"	MS-650
90'-6" TO 120'-6"	1, 5 & 9	8	16 3/8"	MS-600

ALL BOLTS SHALL BE AJAX M20 BOLTS WITH HIGH STRENGTH SHEAR SLEEVES (ASTM A519 WITH MIN Fu=105 KSI). CONTACT SUPPLIER FOR MATERIAL (PLATE & BOLTS) AND INSTALLATION PROCEDURES.

NEW CCI FLAT PLATE REINFORCING (OPTION #3)

ELEVATION	FLAT #	NO. OF END BOLTS (PER END)	INTERMEDIATE BOLT SPACING	FLAT PLATE
0'-6" TO 30'-6"	1, 5 & 9	12	17"	ISP-UR-1006
30'-6" TO 60'-6"	1, 5 & 9	9	18"	ISP-UR-1005
60'-6" TO 90'-6"	1, 5 & 9	7	20"	ISP-UR-1004
90'-6" TO 120'-6"	1, 5 & 9	5	15"	ISP-UR-0764

ALL BOLTS SHALL BE AJAX M20 BOLTS WITH HIGH STRENGTH SHEAR SLEEVES (ASTM A519 WITH MIN Fu=105 KSI). CONTACT SUPPLIER FOR MATERIAL (PLATE & BOLTS) AND INSTALLATION PROCEDURES.



POLE ELEVATION 1/S-4

STATE OF CONNECTICUT JOSEPH PACHICARAH JACOBS No. PEN 22731 LICENSED PROFESSIONAL ENGINEER

JUL 2 6 2012

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street - Suite 1500 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

CROWN CASTLE
THE PIANO WORKS349 WEST, EAST ROCHESTER, NY 14445
PH: (585) 899-3445 FAX: (585) 899-3448

BU #806373; HRT 101 943232
ENFIELD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37512-1571
DRAWN BY: S.S.
CHECKED BY: K.A.T.
APPROVED BY:
DATE: 7-24-2012

ISSUE DATE OF PERMIT: 7-24-2012

S-4

37512-1571 PERMIT.DWG

SPECIAL INSPECTION OF EXISTING SHAFT-TO-FLANGE WELD CONNECTIONS:

(1.) PRIOR TO CONSTRUCTION, CONTRACTOR'S INSPECTION AGENCY SHALL INSPECT CONDITION OF EXISTING SHAFT-TO-BASE-PLATE WELD CONNECTION. ALSO INSPECT EXISTING STIFFENERS IF PRESENT. THE CONTRACTOR'S INSPECTION AGENCY SHALL USE THE FOLLOWING INSPECTION METHODS, OR COMBINATION OF METHODS, AS REQUIRED TO IDENTIFY ANY CRACKS: VISUAL, MAGNETIC PARTICLE, AND/OR ULTRA-SONIC. IN ADDITION, OTHER TEST METHODS MAY ALSO BE USED AT THE RECOMMENDATION OF THE TESTING AGENCY AND UPON THE APPROVAL OF THE OWNER AND THE ENGINEER. CONTRACTOR SHALL PROVIDE CAREFUL AND THOROUGH DOCUMENTATION OF THIS INSPECTION TO THE OWNER AND THE ENGINEER BEFORE PROCEEDING WITH WORK. CONTRACTOR SHALL COORDINATE THESE INSPECTION ACTIVITIES WITH THE OWNER'S REQUIRED PROCESSES AND PROCEDURES. IMPORTANT: THE TESTING AGENCY SHALL IMMEDIATELY REPORT ANY INDICATIONS OF CRACKS, FRACTURES, DISTRESS, AND/OR CORROSION TO THE OWNER AND ENGINEER.

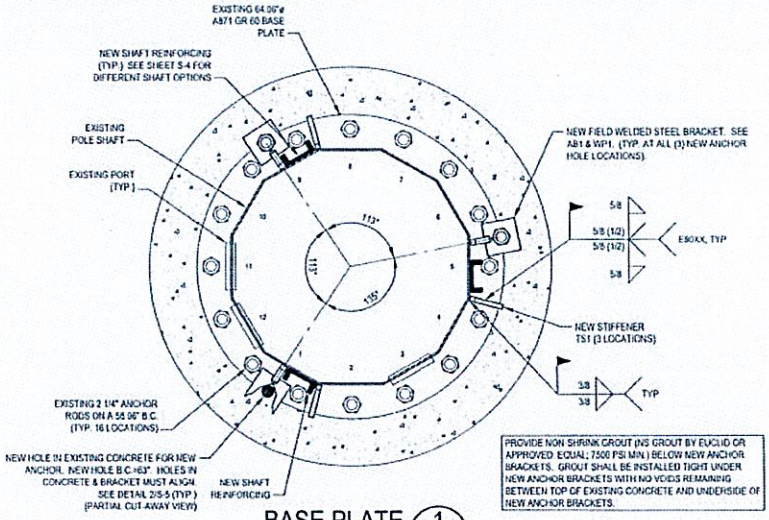
(2.) AFTER CONSTRUCTION, TESTING AGENCY SHALL INSPECT ANY AND ALL FIELD WELDS AND FIELD REPAIRS IMPLEMENTED AS REQUIRED BY THE OWNER FROM THE RESULTS OF THE INSPECTION IN THE PREVIOUS NOTE (1) ABOVE.

GENERAL NOTES:

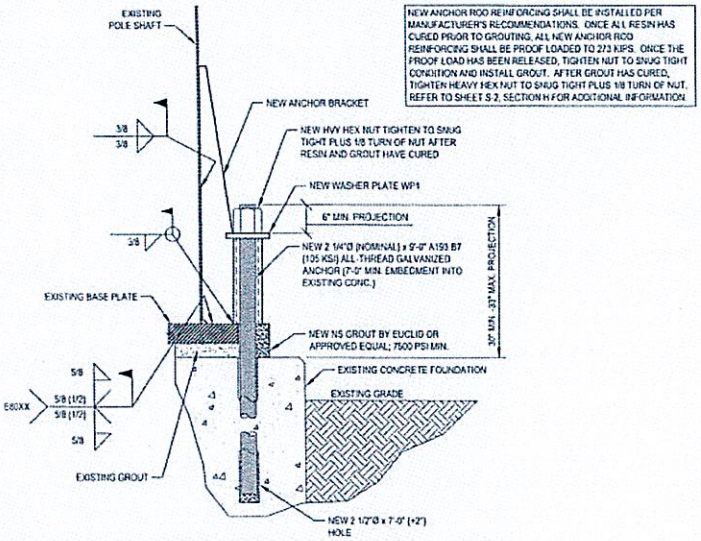
1. AJAX BOLTS ARE TO BE 20 mm Ø WITH CORRESPONDING 29 mm Ø SHEAR SLEEVE WITH MATCHING STEEL GRADE. DRILLED HOLE DIAMETERS IN REINFORCING STEEL AND EXISTING SHAFT SHALL BE 1 3/16"ø MAX.

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 1-800-631-3275 FOR PRODUCT INFORMATION.

3. EPOXY MUST BE HILTI RE-500.



BASE PLATE 1 / S-5



NEW ANCHOR & BRACKET DETAIL 2 / S-5

STATE OF CONNECTICUT
JOSEPH PACHICARAN JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

JUL 26 2012

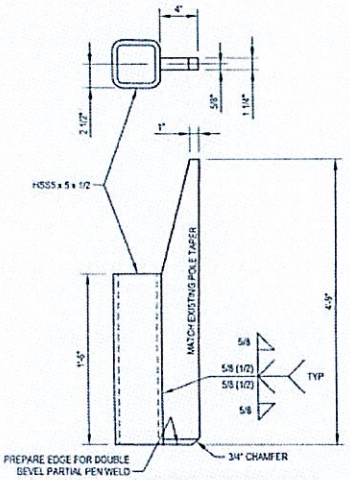
PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 1500 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

CROWN CASTLE
THE PIANO WORKS 348 WEST, EAST ROCHESTER, NY 14445
PH: (585) 899-3445 FAX: (585) 899-3448

BU #806373; HRT 101 943232
ENFIELD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

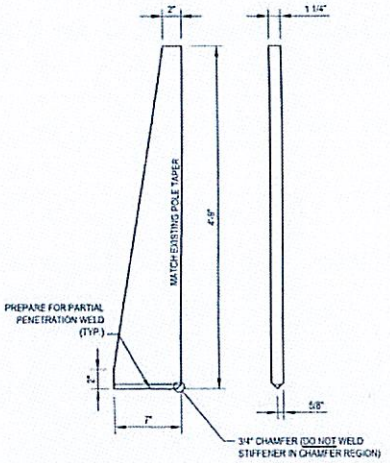
PROJECT No: 37512-1571	ISSUE DATE OF PERMIT: 7-24-2012
DRAWN BY: S.S.	
CHECKED BY: K.A.T.	
APPROVED BY	S-5
DATE: 7-24-2012	

37512-1571 PERMIT.DWG



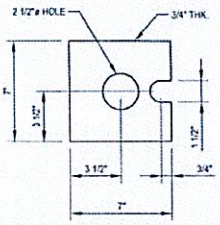
ANCHOR BRACKET MK~AB1

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



TRANSITION STIFFENER MK~TS1

(3 REQUIRED) (Fy = 65 KSI)



WASHER PLATE MK~WP1

(3 REQUIRED) (Fy = 50 KSI)

STATE OF CONNECTICUT
JOSEPH PACIFICA TASI JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

JUL 2 6 2012

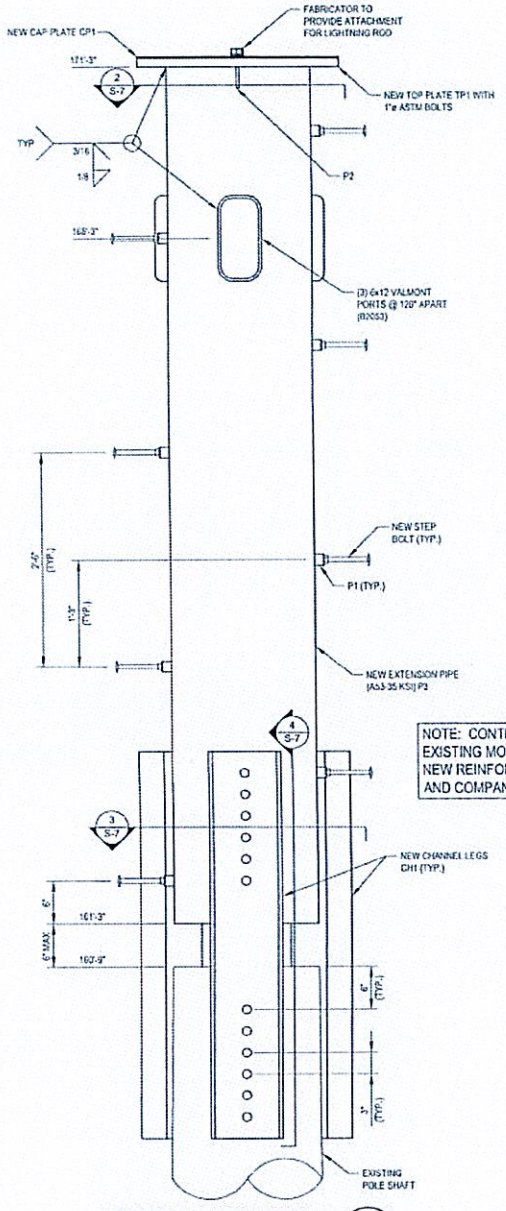
PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 1500 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

CROWN CASTLE
THE PIANO WORKS 349 WEST, EAST ROCHESTER, NY 14445
PH: (585) 899-3445 FAX: (585) 899-3448

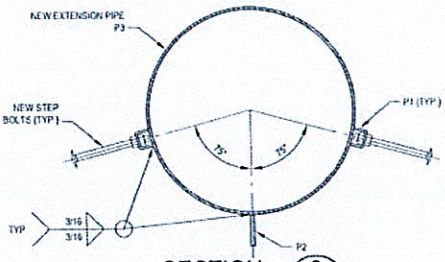
BU #806373; HRT 101 943232
ENFIELD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37512-1571	ISSUE DATE OF PERMIT: 7-24-2012
DRAWN BY: S.S.	
CHECKED BY: K.A.T.	
APPROVED BY:	S-6
DATE: 7-24-2012	

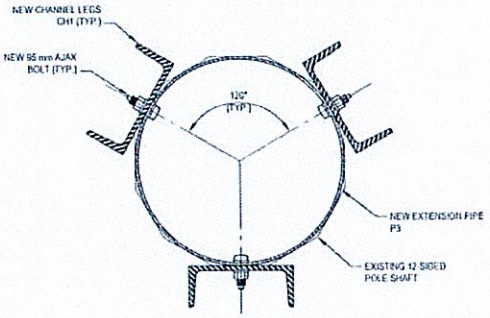
37512-1571 PERMIT.DWG



PARTIAL ELEVATION 1 S-7

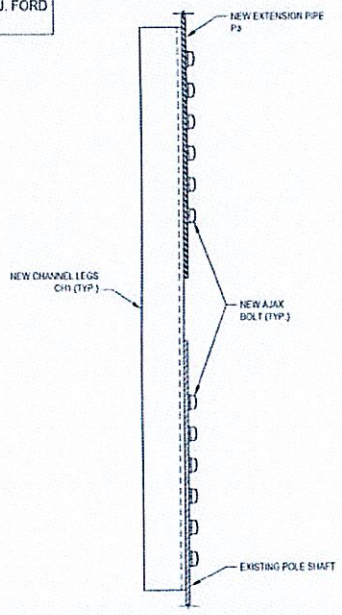


SECTION 2 S-7



SECTION 3 S-7

NOTE: CONTRACTOR TO VERIFY THAT EXISTING MOUNT DOES NOT INTERFERE WITH NEW REINFORCEMENT. NOTIFY PAUL J. FORD AND COMPANY IF A CONFLICT EXISTS.



SECTION 4 S-7

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 1500 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

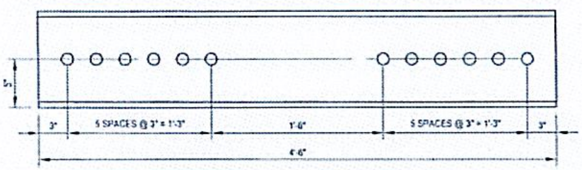
CROWN CASTLE
THE PIANO WORKS349 WEST, EAST ROCHESTER, NY 14445
PH: (585) 899-3445 FAX: (585) 899-3448

BU #806373; HRT 101 943232
ENFIELD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

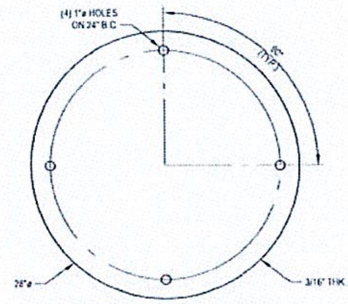
PROJECT No: 37512-1571	ISSUE DATE OF PERMIT: 7-24-2012
DRAWN BY: S.S.	
CHECKED BY: K.A.T.	
APPROVED BY:	S-7
DATE: 7-24-2012	

MONOPOLE EXTENSION MATERIAL LIST

MARK	QTY	MATERIAL	APPROX. LENGTH	STEEL WEIGHT
CH1	3	CHANNEL MC10 x 28.5	4'-3"	126
CP1	1	CAP PLATE 3/16" x 28"ø		33
P1	8	PLATE 3/16" x 1 1/2"	0'-4 5/8"	3
P2	1	PLATE 3/8" x 3"	0'-3"	1
P3	1	EXTENSION PIPE 20"ø x 1/4"	10'-0"	
TP1	1	TOP PLATE 1 1/2" x 28"ø		177
	18	AJAX BOLT SLEEVE	1/2"	
	8	5/8"ø STEP BOLT	7"	
	16	LOCK WASHERS AND NUTS FOR 5/8"ø BOLTS		
	36	20mmø STANDARD AJAX BOLT	95 mm	
			TOTAL (LBS)	181



CHANNEL LEG MK~CH1
(3 REQUIRED) (Fy50 KSI)



CAP PLATE MK~CP1
(1 REQUIRED) (Fy = 36 KSI)

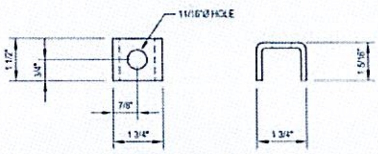


PLATE MK~P1
(8 REQUIRED) (Fy = 36 KSI)

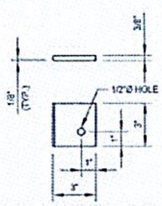
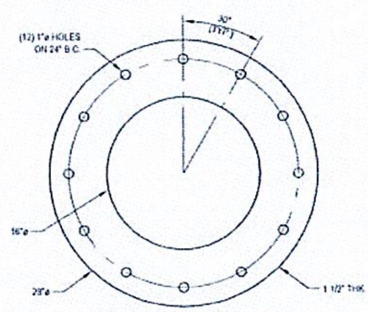


PLATE MK~P2
(1 REQUIRED) (Fy = 36 KSI)



TOP PLATE MK~TP1
(1 REQUIRED) (Fy = 50 KSI)

STATE OF CONNECTICUT
JOSEPH PACHICARAY JACOBS
No. PEN 22731
LICENSED
PROFESSIONAL ENGINEER
JUL 2 6 2012

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 1500 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

CROWN CASTLE
THE PIANO WORKS349 WEST, EAST ROCHESTER, NY 14445
PH. (585) 899-3445 FAX. (585) 899-3448

BU #806373; HRT 101 943232
ENFIELD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37512-1571
DRAWN BY: S.S.
CHECKED BY: K.A.T.
APPROVED BY:
DATE: 7-24-2012

ISSUE DATE OF PERMIT: 7-24-2012

S-8

37512 1571 PERMIT.DWG

MODIFICATION INSPECTION NOTES:

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

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

ALL MI'S SHALL BE CONDUCTED BY A CROWN ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN. SEE ENG-BUL-10172 LIST OF APPROVED MI VENDORS.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

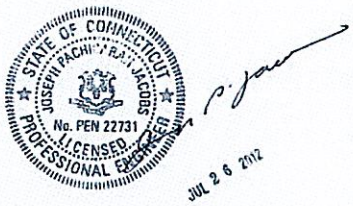
PHOTOS OF ELEVATED MODIFICATIONS TAKEN FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.

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

MI CHECKLIST

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
	PRE-CONSTRUCTION
X	MI CHECKLIST DRAWINGS
x	EOR APPROVED SHOP DRAWINGS
x	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
x	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
x	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
	CONSTRUCTION
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
X	POST INSTALLED ANCHOR ROD VERIFICATION
X	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: LIFT AND DENSITY
x	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
X	INSPECTION OF BOLT PRETENSION PER AISC BOLT SPEC
X	INSPECTION OF AJAX BOLTS AND DTIS PER REQUIREMENTS ON SHEET S-3
ADDITIONAL TESTING AND INSPECTIONS:	
	POST-CONSTRUCTION
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
x	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

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



JUL 26 2012

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 1500 · Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

CROWN CASTLE
THE PIANO WORKS 349 WEST EAST ROCHESTER, NY 14445
PH: (585) 899-3445 FAX: (585) 899-3448

BU #806373; HRT 101 943232
ENFIELD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37512-1571	ISSUE DATE OF PERMIT: 7-24-2012
DRAWN BY: S.S.	
CHECKED BY: K.A.T.	
APPROVED BY	S-9
DATE: 7-24-2012	

C Squared Systems, LLC
65 Dartmouth Drive, Unit A3
Auburn, NH 03032
(603) 644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions

at&t

CT5154 – AWE-Enfield

4 Oliver Road, Enfield, CT 06082

July 30, 2012

Table of Contents

1. Introduction 1
2. FCC Guidelines for Evaluating RF Radiation Exposure Limits 1
3. RF Exposure Prediction Methods 2
4. Calculation Results 3
5. Conclusion 4
6. Statement of Certification 4
Attachment A: References 5
Attachment B: FCC Limits for Maximum Permissible Exposure (MPE) 6
Attachment C: AT&T Antenna Data Sheets and Electrical Patterns 8

List of Tables

Table 1: Carrier Information 3
Table 2: FCC Limits for Maximum Permissible Exposure (MPE) 6

List of Figures

Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE) 7

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed modifications to the existing AT&T antenna arrays mounted on the monopole tower located at 4 Oliver Road in Enfield, CT. The coordinates of the tower are 41° 57' 36.2" N, 72° 35' 32.3" W.

AT&T is proposing the following modifications:

1) Install three 700 MHz LTE antennas (one per sector).

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{1.6^2 \times EIRP}{4\pi \times R^2} \right) \text{x Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the finished modifications.

4. Calculation Results

Table 1 below outlines the power density information for the site. Because the proposed AT&T antennas are directional in nature, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to Attachment C for the vertical pattern of the proposed AT&T antennas. The calculated results for AT&T in Table 1 include a nominal 10 dB off-beam pattern loss to account for the lower relative gain below the antennas.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	%MPE
Cingular GSM	*160*	*1900*	*2*	*427*	*0.0120*	*1.0000*	*1.20%*
Cingular UMTS	*160*	*880*	*1*	*500*	*0.0070*	*0.5867*	*1.20%*
Verizon	152	869	9	288	0.0403	0.5793	6.96%
Verizon	152	1970	3	436	0.0204	1.0000	2.04%
Verizon	152	757	1	834	0.0130	0.5047	2.57%
T-Mobile GSM	117	1945	8	135	0.0284	1.0000	2.84%
T-Mobile UMTS	117	2100	2	760	0.0399	1.0000	3.99%
Clearwire	137	2496	2	153	0.0059	1.0000	0.59%
Clearwire	139	11 GHz	1	211	0.0039	1.0000	0.39%
MetroPCS	106	2140	3	727	0.0698	1.0000	6.98%
Sprint	140	1900	11	132	0.0266	1.0000	2.66%
Nextel	130	851	1	542	0.0115	0.5673	2.03%
XM Sat Radio	95	2330	1	293	0.0117	1.0000	1.17%
Page Net	110	930	1	510	0.0152	0.6200	2.45%
AT&T UMTS	160	880	2	565	0.0016	0.5867	0.27%
AT&T UMTS	160	1900	2	875	0.0025	1.0000	0.25%
AT&T LTE	158	734	1	1375	0.0020	0.4893	0.40%
AT&T GSM	160	880	1	283	0.0004	0.5867	0.07%
AT&T GSM	160	1900	4	525	0.0029	1.0000	0.29%
						Total	**35.95%**

Table 1: Carrier Information [1] [2] [3]

[1] The existing CSC filing for Cingular should be removed and replaced with the updated AT&T technologies and values provided in Table 1. The power density information for carriers other than AT&T was taken directly from the CSC database dated 3/29/2012. Please note that %MPE values listed are rounded to two decimal points. The total %MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not reflect the total value listed in the table.

[2] In the case where antenna models are not uniform across all 3 sectors for the same frequency band, the antenna model with the highest gain was used for the calculations to present a worse-case scenario.

[3] Antenna height listed for AT&T is in reference to the Paul J Ford and Company Structural Engineers Structural Analysis dated July 24, 2012 and Construction Drawings prepared by Hudson Design Group dated 4/6/12.

5. Conclusion

The above analysis verifies that emissions from the existing site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed transmit antennas at the existing facility is well below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at ground level is **35.95% of the FCC limit**.

As noted previously, obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished modifications.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.

Daniel L. Goulet
C Squared Systems, LLC

July 30, 2012
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure[4]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $|E|^2$, $|H|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure[5]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $|E|^2$, $|H|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 2: FCC Limits for Maximum Permissible Exposure (MPE)

[4] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure

[5] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

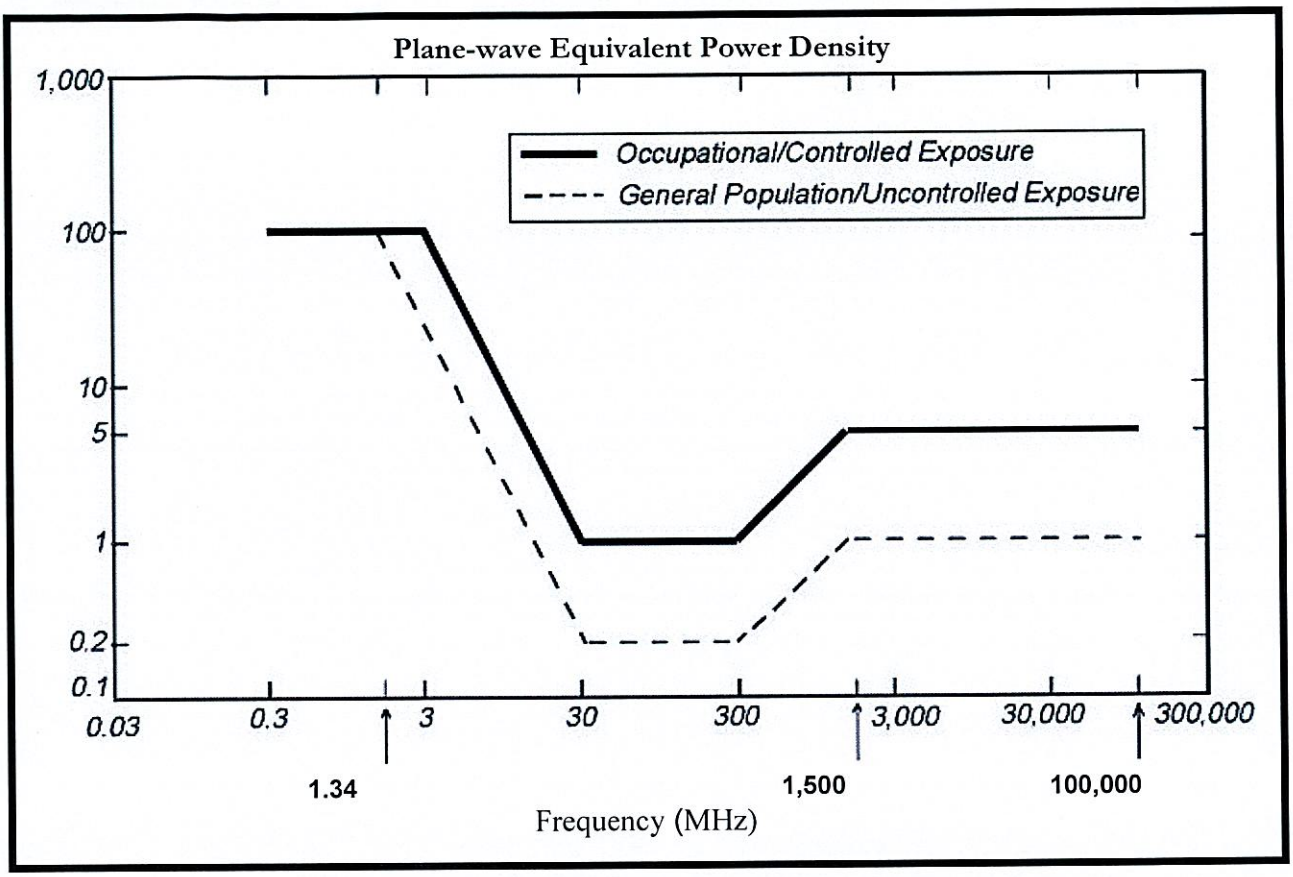
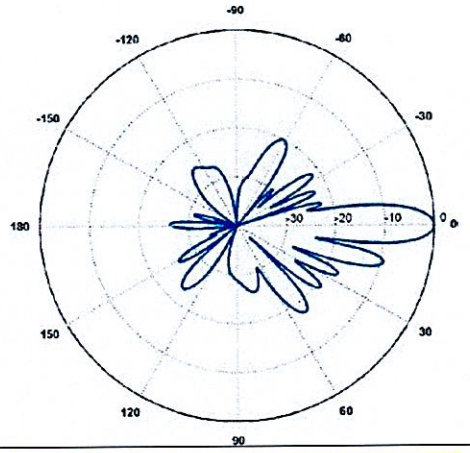


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: AT&T Antenna Data Sheets and Electrical Patterns

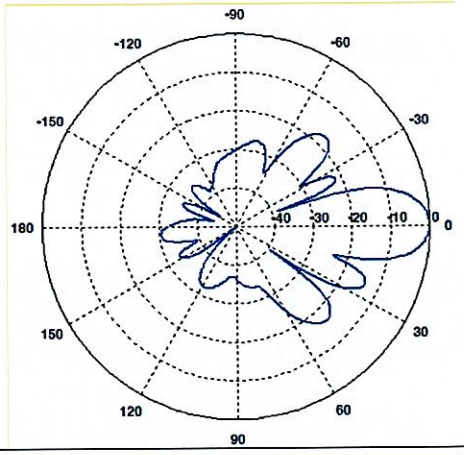
700 MHz

Manufacturer:	Commscope
Model #:	SBNH-1D6565C
Frequency Band:	698-806 MHz
Gain:	13.6 dBd
Vertical Beamwidth:	8.6°
Horizontal Beamwidth:	71°
Polarization:	± 45°
Size L x W x D:	96.42" x 11.85" x 7.1"



850 MHz

Manufacturer:	Powerwave
Model #:	7770
Frequency Band:	824-896 MHz
Gain:	11.5 dBd
Vertical Beamwidth:	15°
Horizontal Beamwidth:	85°
Polarization:	Dual Linear ±45°
Size L x W x D:	55.4" x 11" x 5"



1900 MHz

Manufacturer:	Powerwave
Model #:	7770
Frequency Band:	1850-1990 MHz
Gain:	13.4 dBd
Vertical Beamwidth:	7°
Horizontal Beamwidth:	90°
Polarization:	Dual Linear ±45°
Size L x W x D:	55.4" x 11" x 5"