STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

August 17, 2012

Jennifer Young Gaudet
HPC Wireless Services
46 Mill Plain Road, Floor 2
Danbury, CT 06811

RE: **EM-CING-043-120730** – New Cingular Wireless PCS, LLC notice of intent to modify an existing telecommunications facility located at 1455 Forbes Street, East Hartford, Connecticut.

Dear Ms. Gaudet:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Modifications to the tower be completed in accordance with the recommendations made in the Structural Modification Report prepared by Paul J. Ford and Company dated June 22, 2012 , and stamped by Joseph Jacobs; and
- Prior to antenna installation, a signed letter from a Professional Engineer duly licensed in the State of Connecticut shall be submitted to the Council to certify that the recommended modifications have been completed and the tower and foundation will not exceed 100 percent of the post-construction structural rating.
- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated July 27, 2012. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are

conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Linda Roberts
Executive Director

LR/CDM/cm

c: The Honorable Marcia A. Leclerc, Mayor, Town of East Hartford
Michael J. Dayton, Town Planner, Town of East Hartford

EM-CING-043-120730

HPC Wireless Services
46 Mill Plain Rd.
Floor 2
Danbury, CT, 06811
P.: 203.797.1112

HPC WIRELESS SERVICES

ORIGINAL

RECEIVED
JUL 30 2012
CONNECTICUT SITING COUNCIL

July 27, 2012

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
1455 Forbes Street, East Hartford, 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 East Hartford.

AT&T plans to modify the existing wireless communications facility owned by Crown Castle and located at 1455 Forbes Street, East Hartford (coordinates 41°-43'-53.6" N, 72°-36'-28.13" 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 add T-arm mounts to the tower, relocate three (3) existing GSM/UMTS antennas to the T-arms, and add three (3) LTE panel antennas, all at a center line of approximately 120'. Six (6) RRHs (remote radio heads) and a surge arrestor will be mounted behind the antennas on new pipes. 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 130' structure.

2. AT&T will remove one cabinet from the existing concrete pad. Two cabinets, one on a new H-frame, will be placed on a new concrete pad adjacent to the existing AT&T padA 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 2.46%; the combined site operations will result in a total power density of approximately 80.27%.

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.

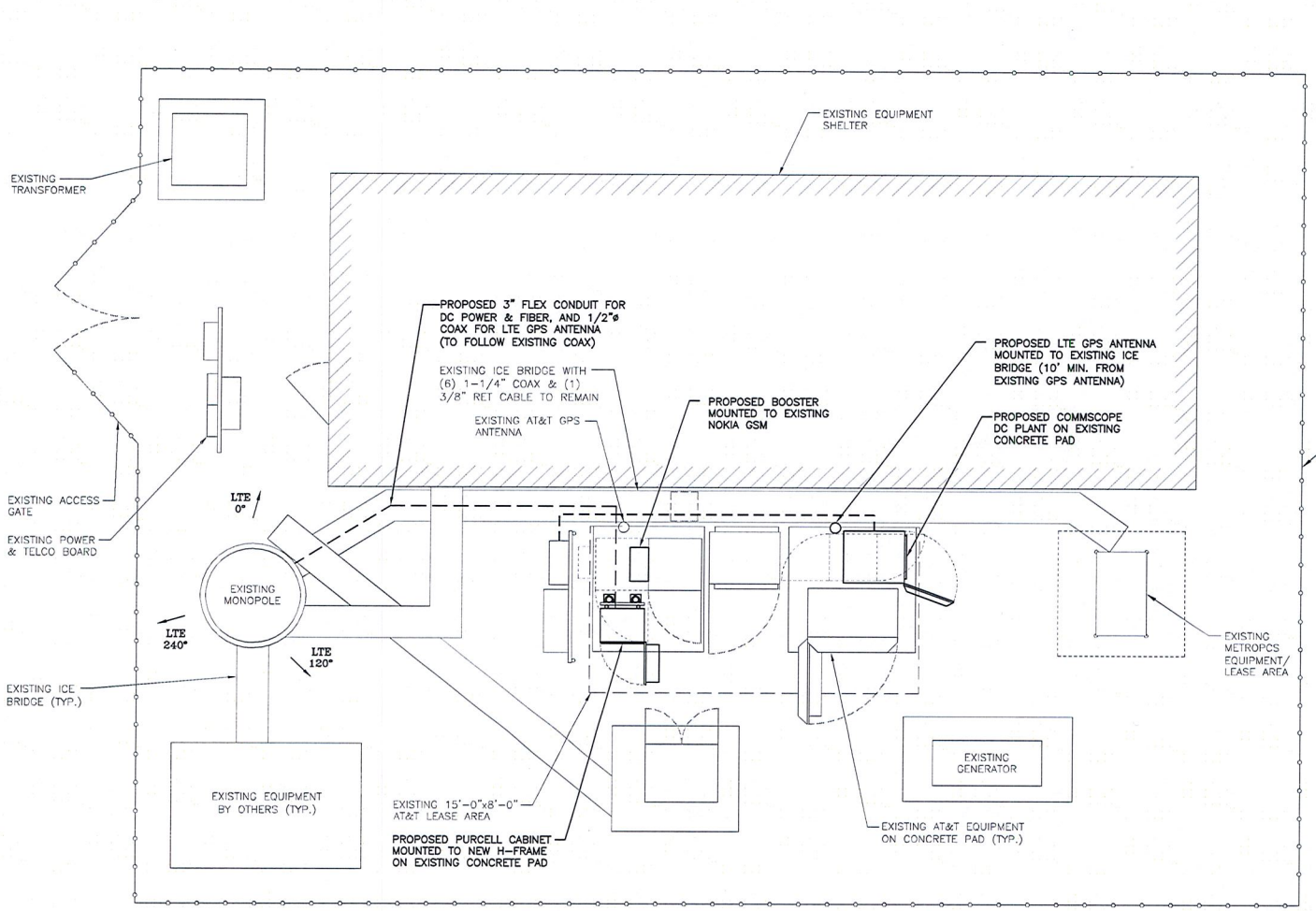
Respectfully yours,

Jennifer Young Gaudet (AWH)

Jennifer Young Gaudet

Attachments

cc: Honorable Marcia A. Leclerc, Mayor of East Hartford
Jessie K. Handel (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.

PROPOSED COMMSCOPE DC PLANT TO BE INSTALLED AND LIVE PRIOR TO NOKIA NUSS REMOVAL AND PURCELL INSTALLATION.

COMPOUND PLAN

SCALE: 3/8"=1'-0"

0 1'-4" 2'-8" 5'-4" 8'-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: CT5276
SITE NAME: EAST HARTFORD SOUTH
CROWN CASTLE ID: 806376
1455 FORBES STREET
EAST HARTFORD, CT 06118
HARTFORD COUNTY

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

NO.	DATE	REVISIONS	BY	CHK	APP'D
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2	07/06/12	CONSTRUCTION REVISED	RV	DC	DPH
1	05/22/12	ISSUED FOR CONSTRUCTION	MJS	DC	DPH
0	04/06/12	ISSUED FOR REVIEW	MJS	DC	DPH

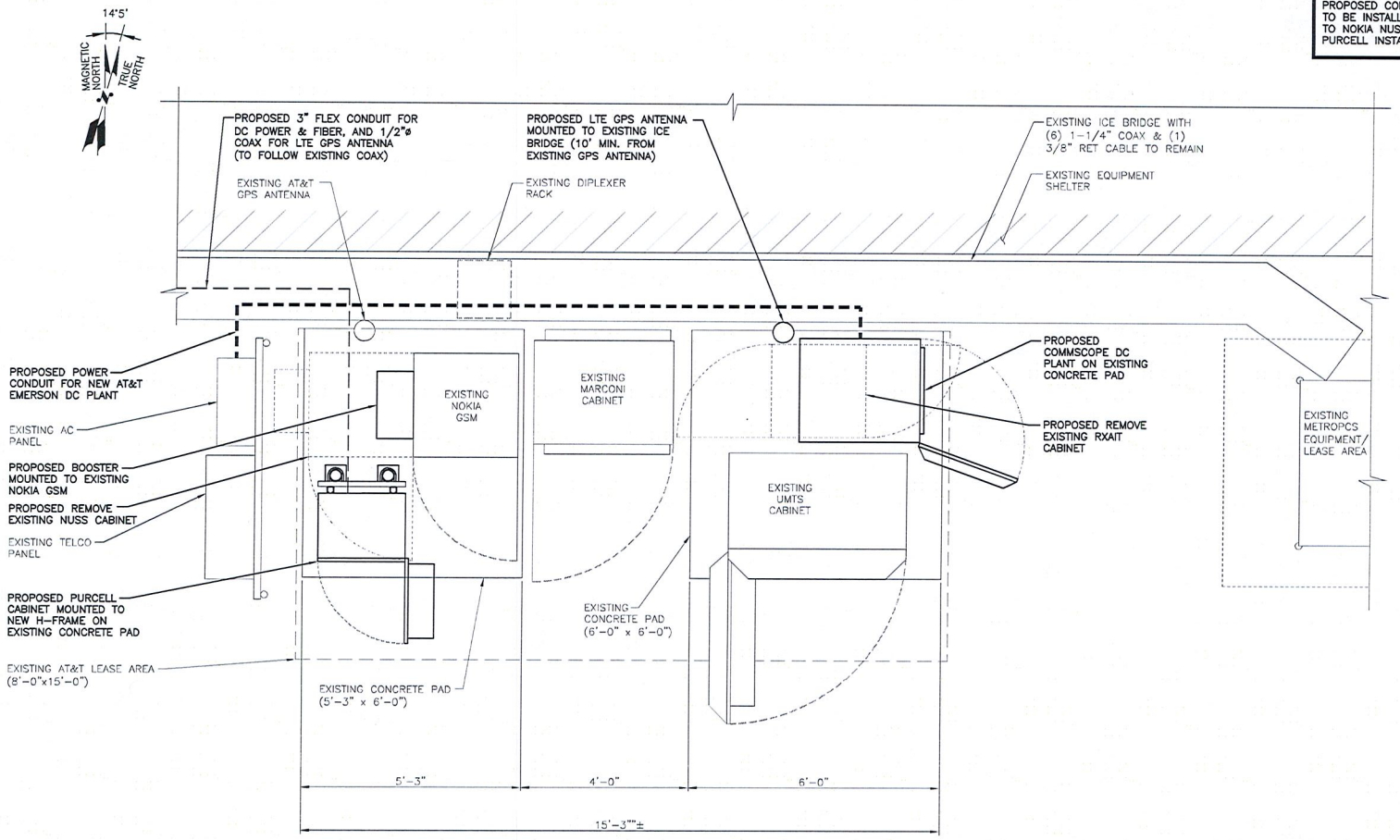
SCALE: AS SHOWN | DESIGNED BY: MJS | DRAWN BY: MJS

STATE OF CONNECTICUT DANIEL P. HAMM No. 24176 LICENSED PROFESSIONAL ENGINEER

AT&T

COMPOUND & EQUIPMENT PLAN (LTE)

JOB NUMBER	DRAWING NUMBER	REV
5276.01	A-1	3



EQUIPMENT PLAN

SCALE: 3/4"=1'-0"

0 0'-8" 1'-4" 2'-8" 4'-0"

PROPOSED COMMSCOPE DC PLANT TO BE INSTALLED AND LIVE PRIOR TO NOKIA NUSS REMOVAL AND PURCELL INSTALLATION.

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.

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AT&T

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JOB NUMBER	DRAWING NUMBER	REV
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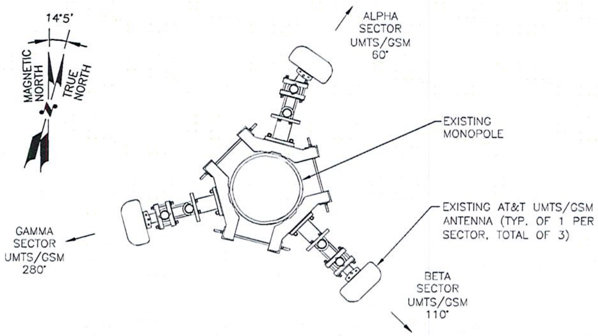
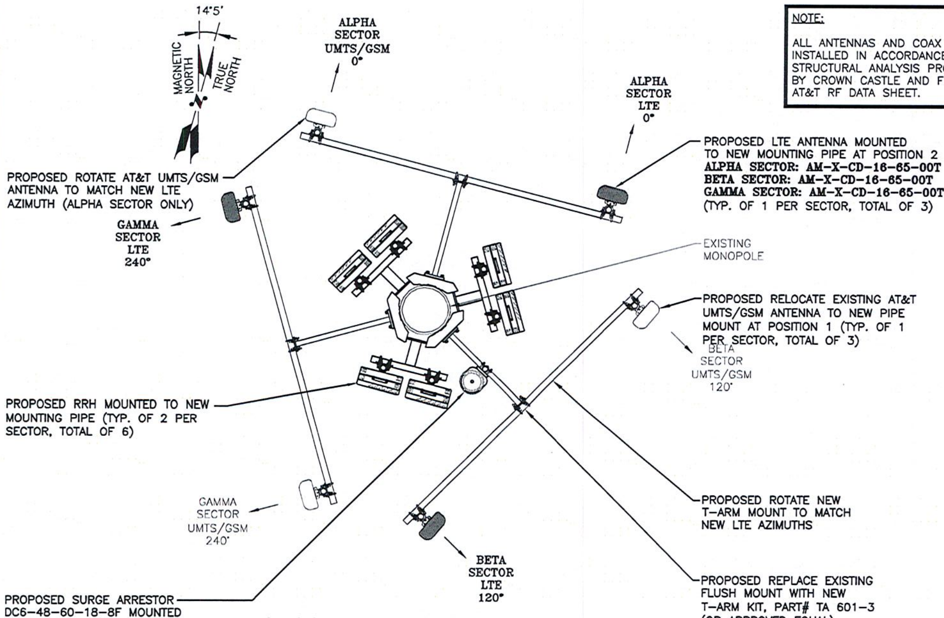


EXISTING UMTS/GSM ANTENNA PLAN

SCALE: N.T.S.



14°5'
MAGNETIC NORTH
TRUE NORTH
ALPHA SECTOR UMTS/GSM 0°
ALPHA SECTOR LTE 0°
PROPOSED ROTATE AT&T UMTS/GSM ANTENNA TO MATCH NEW LTE AZIMUTH (ALPHA SECTOR ONLY)
GAMMA SECTOR LTE 240°
PROPOSED LTE ANTENNA MOUNTED TO NEW MOUNTING PIPE AT POSITION 2
ALPHA SECTOR: AM-X-CD-16-65-00T
BETA SECTOR: AM-X-CD-16-65-00T
GAMMA SECTOR: AM-X-CD-16-65-00T
(TYP. OF 1 PER SECTOR, TOTAL OF 3)
EXISTING MONOPOLE
PROPOSED RELOCATE EXISTING AT&T UMTS/GSM ANTENNA TO NEW PIPE MOUNT AT POSITION 1 (TYP. OF 1 PER SECTOR, TOTAL OF 3)
BETA SECTOR UMTS/GSM 120°
PROPOSED RRH MOUNTED TO NEW MOUNTING PIPE (TYP. OF 2 PER SECTOR, TOTAL OF 6)
PROPOSED ROTATE NEW T-ARM MOUNT TO MATCH NEW LTE AZIMUTHS
GAMMA SECTOR UMTS/GSM 240°
BETA SECTOR LTE 120°
PROPOSED REPLACE EXISTING FLUSH MOUNT WITH NEW T-ARM KIT, PART# TA 601-3 (OR APPROVED EQUAL)
PROPOSED SURGE ARRESTOR DC6-48-60-18-8F MOUNTED TO NEW MOUNTING PIPE

PROPOSED LTE ANTENNA PLAN

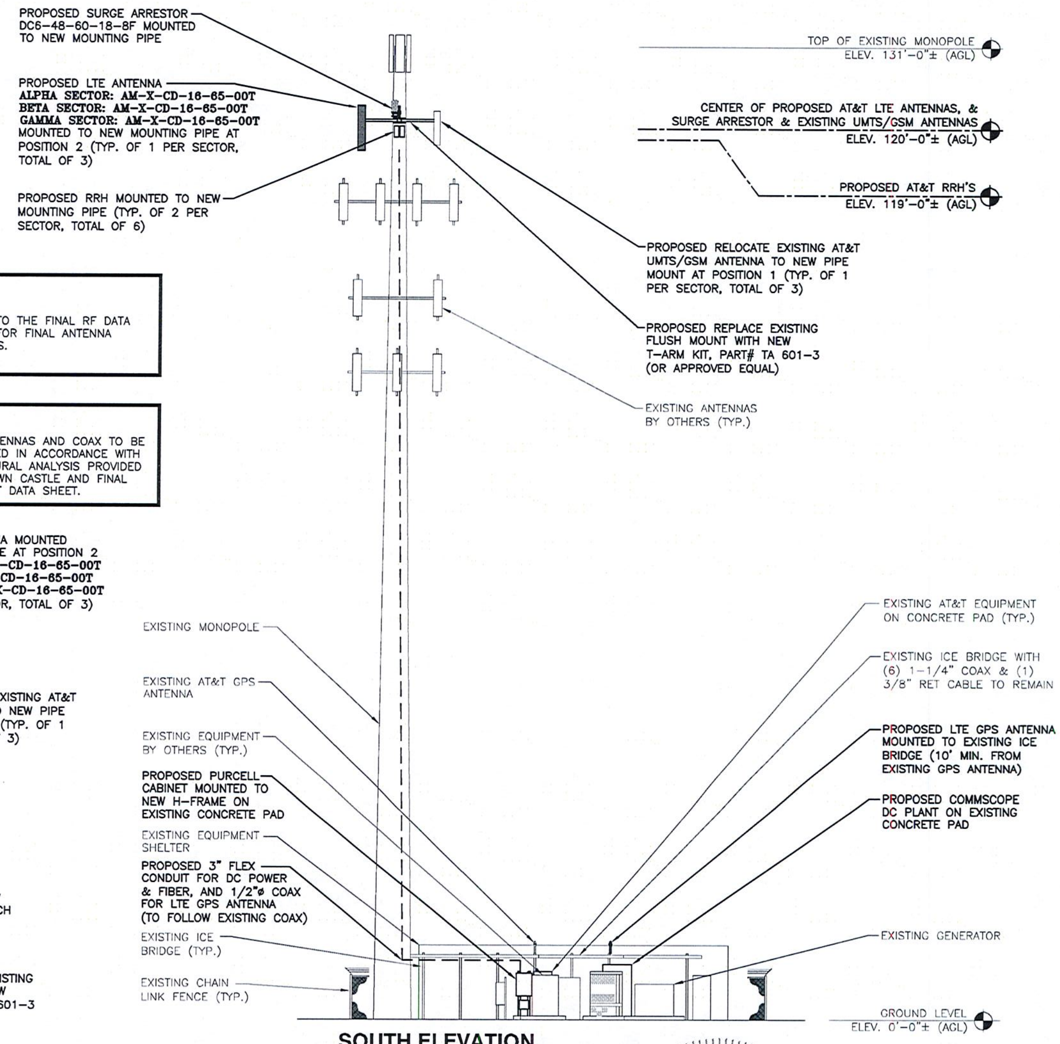
SCALE: N.T.S.

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 SURGE ARRESTOR DC6-48-60-18-8F MOUNTED TO NEW MOUNTING PIPE
PROPOSED LTE ANTENNA
ALPHA SECTOR: AM-X-CD-16-65-00T
BETA SECTOR: AM-X-CD-16-65-00T
GAMMA SECTOR: AM-X-CD-16-65-00T
MOUNTED TO NEW MOUNTING PIPE AT POSITION 2 (TYP. OF 1 PER SECTOR, TOTAL OF 3)
PROPOSED RRH MOUNTED TO NEW MOUNTING PIPE (TYP. OF 2 PER SECTOR, TOTAL OF 6)
TOP OF EXISTING MONOPOLE
ELEV. 131'-0"± (AGL)
CENTER OF PROPOSED AT&T LTE ANTENNAS, & SURGE ARRESTOR & EXISTING UMTS/GSM ANTENNAS
ELEV. 120'-0"± (AGL)
PROPOSED AT&T RRH'S
ELEV. 119'-0"± (AGL)
PROPOSED RELOCATE EXISTING AT&T UMTS/GSM ANTENNA TO NEW PIPE MOUNT AT POSITION 1 (TYP. OF 1 PER SECTOR, TOTAL OF 3)
PROPOSED REPLACE EXISTING FLUSH MOUNT WITH NEW T-ARM KIT, PART# TA 601-3 (OR APPROVED EQUAL)
EXISTING ANTENNAS BY OTHERS (TYP.)
EXISTING MONOPOLE
EXISTING AT&T GPS ANTENNA
EXISTING EQUIPMENT BY OTHERS (TYP.)
PROPOSED PURCELL CABINET MOUNTED TO NEW H-FRAME ON EXISTING CONCRETE PAD
EXISTING EQUIPMENT SHELTER
PROPOSED 3" FLEX CONDUIT FOR DC POWER & FIBER, AND 1/2"ø COAX FOR LTE GPS ANTENNA (TO FOLLOW EXISTING COAX)
EXISTING ICE BRIDGE (TYP.)
EXISTING CHAIN LINK FENCE (TYP.)
EXISTING AT&T EQUIPMENT ON CONCRETE PAD (TYP.)
EXISTING ICE BRIDGE WITH (6) 1-1/4" COAX & (1) 3/8" RET CABLE TO REMAIN
PROPOSED LTE GPS ANTENNA MOUNTED TO EXISTING ICE BRIDGE (10' MIN. FROM EXISTING GPS ANTENNA)
PROPOSED COMMSCOPE DC PLANT ON EXISTING CONCRETE PAD
EXISTING GENERATOR
GROUND LEVEL
ELEV. 0'-0"± (AGL)

SOUTH ELEVATION

SCALE: 1/8"=1'-0"

0 4'-0" 8'-0" 16'-0" 24'-0"

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SCALE: AS SHOWN | DESIGNED BY: MJS | DRAWN BY: MJS

AT&T

ANTENNA LAYOUT AND ELEVATION (LTE)

JOB NUMBER	DRAWING NUMBER	REV
5276.01	A-3	3

DANIEL P. HAMM No. 24178 LICENSED PROFESSIONAL ENGINEER

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

Date: **June 22, 2012**

Andrew Bazinet
Crown Castle USA Inc.
349 West Commercial Street, Suite 2630
East Rochester, NY 14445
(585) 899-3442

Paul J. Ford and Company
250 East Broad Street #1500
Columbus, OH 43215
(614) 221-6679
dkramer@pjfweb.com

Subject: **Structural Modification Report**

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT5276
	Carrier Site Name:	AWE-East Hartford South
Crown Castle Designation:	**Crown Castle BU Number:**	806376
	Crown Castle Site Name:	HRT 100 943239
	Crown Castle JDE Job Number:	183522
	Crown Castle Work Order Number:	501367
	Crown Castle Application Number:	145105 Rev. 1
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37512-1659BP_SABRE
Site Data:	**1455 FORBES STREET, EAST HARTFORD, Hartford County, CT** **Latitude *41° 43' 53.3"*, Longitude *-72° 36' 28"*** **130 Foot - Monopole Tower**	

Dear Andrew Bazinet,

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 469009, in accordance with application 145105, revision 1.

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 Loading **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

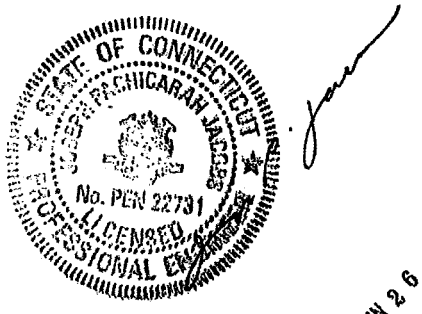
The analysis has been performed in accordance with the TIA/EIA-222-F standard and local code requirements based upon a fastest mile wind speed of 80 mph with no ice, 28.1 mph with 1 inch ice thickness and 50 mph under service loads.

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:

D. Scott Kramer

D. Scott Kramer, P.E.
Project Engineer



JUN 26 2012

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 130-ft Monopole tower designed by VALMONT in January of 1991.

The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 28.1 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
121	121	1	tower mounts	T-Arm Mount [TA 601-3]	2 1	3/4 3/8	-
	120	3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
119	119	6	ericsson	RRUS-11			
		1	tower mounts	Side Arm Mount [SO 102-3]			

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
128	128	3	rfs	APXV18-206517S-C w/ Mount Pipe	6	1 5/8	1
		1	tower mounts	Pipe Mount [SO 102.3]			
121	121	1	tower mounts	Pipe Mount [PM 501-3]	-	-	2
	120	3	kathrein	800 10121 w/ Mount Pipe	6	1 1/4	1
		6	powerwave technologies	LGP21401			
107	109	2	adc	DUAL BAND 800/1900 FULL BAND MASTHEAD	12	1 5/8	1
		1	antel	BXA-185060/8CFx2 w/ Mount Pipe			
		2		BXA-185090/8CF w/ Mount Pipe			
		3		BXA-70063/6CFx4 w/ Mount Pipe			
		6	decibel	DB844G65ZAXY w/ Mount Pipe			
	107	1	tower mounts	Platform Mount (LP 101-1)			
97	101	2	andrew	Andrew VHLP2.5-11	6 6 3 3	1 1/4 1 5/8 1/2 5/16	1
		2	dragonwave	Horizon Compact			
	97	6	decibel	DB980H90E-M w/ Mount Pipe			
		3	kathrein	840 10054 w/ Mount Pipe			
		1	motorola	TIMING 2000			
		3	samsung telecommunications	WIMAX DAP HEAD			
		1	tower mounts	Platform Mount [LP 602-1]			
87	87	3	andrew	ETW190VS12UB	12	1 1/4	1
		6	rfs	APXV18-206516S-C-A20 w/ Mount Pipe			
		3		RFS ATMAA-1412D-1A20			
		1	tower mounts	Side Arm Mount [SO 702-3]			

Notes:
1) Existing Equipment
2) Equipment To be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, Geotechnical Engineering	262381	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	SAC Engineering	262389	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont	262386	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	CCI	3154689	CCISITES
PROPOSED MODIFICATION DRAWINGS	PJF, 37512-0659BP, 6/22/2012	-	PJF
4-TOWER STRUCTURAL ANALYSIS REPORTS	Valmont, 10888-91	645113	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	130 - 110	Pole	TP15.525x10.525x0.188	1	-2	483	37.9	Pass
L2	110 - 81	Pole	TP22.779x15.525x0.25	2	-8	943	95.5	Pass
L3	81 - 70	Pole	TP25.531x22.779x0.377	3	-9	1331	81.0	Pass
L4	70 - 59.5	Pole	TP27.657x23.776x0.313	4	-11	1433	98.0	Pass
L5	59.5 - 45.5	Pole	TP31.159x27.657x0.41	5	-14	1862	90.0	Pass
L6	45.5 - 34.08	Pole	TP34.015x31.159x0.405	6	-15	1938	92.3	Pass
L7	34.08 - 20.5	Pole	TP36.78x31.975x0.425	7	-18	2190	92.7	Pass
L8	20.5 - 0	Pole	TP41.9x36.78x0.414	8	-22	2384	94.8	Pass
							Summary	
						Pole (L4)	98.0	Pass
						Rating =	98.0	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Flanged Connection	110	29.6	Pass
1	Anchor Rods	0	82.1	Pass
1	Base Plate	0	58.9	Pass
1	Base Foundation Steel	0	48.4	Pass
1	Base Foundation Soil Interaction	0	58.0	Pass

Structure Rating (max from all components) =	98.0%

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

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:

1) Tower is located in Hartford County, Connecticut.
2) Basic wind speed of 80 mph.
3) Nominal ice thickness of 1.000 in.
4) Ice thickness is considered to increase with height.
5) Ice density of 56 pcf.
6) A wind speed of 28 mph is used in combination with ice.
7) Temperature drop of 50 °F.
8) Deflections calculated using a wind speed of 50 mph.
9) A non-linear (P-delta) analysis was used.
10) Pressures are calculated at each section.
11) Stress ratio used in pole design is 1.333.
12) 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	130.00-110.00	20.00	0.00	12	10.525	15.525	0.188	0.752	A572-65 (65 ksi)
L2	110.00-81.00	29.00	0.00	12	15.525	22.779	0.250	1.000	A572-65 (65 ksi)
L3	81.00-70.00	11.00	4.00	12	22.779	25.531	0.377	1.508	Reinf 56.76 ksi (57 ksi)
L4	70.00-59.50	14.50	0.00	12	23.776	27.657	0.313	1.252	A572-65 (65 ksi)
L5	59.50-45.50	14.00	0.00	12	27.657	31.159	0.410	1.641	Reinf 57.31 ksi (57 ksi)
L6	45.50-34.08	11.42	4.92	12	31.159	34.015	0.405	1.619	Reinf 57.41 ksi (57 ksi)
L7	34.08-20.50	18.50	0.00	12	31.975	36.780	0.425	1.700	Reinf 57.63 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
L8	20.50-0.00	20.50		12	36.780	41.900	0.414	1.656	(58 ksi) Reinf 57.83 ksi (58 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	10.896	6.258	85.346	3.701	5.452	15.654	172.934	3.080	2.317	12.324
	16.073	9.284	278.754	5.491	8.042	34.662	564.831	4.570	3.657	19.451
L2	16.073	12.296	366.206	5.468	8.042	45.537	742.033	6.052	3.491	13.963
	23.583	18.136	1174.973	8.066	11.800	99.576	2380.813	8.926	5.435	21.739
L3	23.583	27.192	1741.844	8.020	11.800	147.618	3529.448	13.383	5.095	13.515
	26.432	30.531	2465.752	9.005	13.225	186.445	4996.281	15.027	5.832	15.472
L4	25.723	23.648	1661.744	8.400	12.316	134.923	3367.143	11.639	5.533	17.678
	28.632	27.559	2630.048	9.789	14.326	183.583	5329.191	13.564	6.573	21.001
L5	28.632	35.998	3411.038	9.754	14.326	238.097	6911.688	17.717	6.312	15.384
	32.258	40.625	4902.477	11.008	16.140	303.744	9933.747	19.994	7.251	17.672
L6	32.258	40.084	4839.013	11.010	16.140	299.812	9805.153	19.728	7.266	17.95
	35.215	43.807	6316.477	12.032	17.620	358.488	12798.895	21.561	8.031	19.841
L7	34.426	43.171	5484.946	11.295	16.563	331.157	11113.988	21.247	7.430	17.485
	38.077	49.746	8391.976	13.015	19.052	440.480	17004.418	24.483	8.718	20.516
L8	38.077	48.468	8181.405	13.019	19.052	429.427	16577.745	23.854	8.748	21.134
	43.378	55.292	12146.615	14.852	21.704	559.644	24612.335	27.213	10.120	24.45

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 130.00-110.00				1	1	1		
L2 110.00-81.00				1	1	1		
L3 81.00-70.00				1	1	1		
L4 70.00-59.50				1	1	1		
L5 59.50-45.50				1	1	1		
L6 45.50-34.08				1	1	1		
L7 34.08-20.50				1	1	1		
L8 20.50-0.00				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
128-FT								
LDF7-50A (1-5/8 FOAM)	C	No	CaAa (Out Of Face)	128.00 - 0.00	2	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
						2" Ice	0.60	10.54
						4" Ice	1.00	30.04
LDF7-50A (1-5/8 FOAM)	C	No	CaAa (Out Of Face)	128.00 - 0.00	4	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						2" Ice	0.00	10.54
						4" Ice	0.00	30.04
97-FT								
2" Rigid Conduit	C	No	CaAa (Out Of Face)	97.00 - 0.00	2	No Ice	0.00	0.95
						1/2" Ice	0.00	2.48
						1" Ice	0.00	4.62
						2" Ice	0.00	10.72
						4" Ice	0.00	30.27
LDF4P-50A(1/2)	C	No	Inside Pole	97.00 - 0.00	2	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
ATCB-B01-005(5/16)	C	No	Inside Pole	97.00 - 0.00	3	No Ice	0.00	0.07
						1/2" Ice	0.00	0.07
						1" Ice	0.00	0.07
						2" Ice	0.00	0.07
						4" Ice	0.00	0.07
LDF4P-50A(1/2)	C	No	CaAa (Out Of Face)	97.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.84
						1" Ice	0.00	2.14
						2" Ice	0.00	6.58
						4" Ice	0.00	22.78
87-FT								
LDF6-50A(1-1/4")	B	No	CaAa (Out Of Face)	87.00 - 0.00	2	No Ice	0.16	0.66
						1/2" Ice	0.25	1.91
						1" Ice	0.35	3.78
						2" Ice	0.55	9.33
						4" Ice	0.95	27.78
LDF6-50A(1-1/4")	B	No	CaAa (Out Of Face)	87.00 - 0.00	10	No Ice	0.00	0.66
						1/2" Ice	0.00	1.91
						1" Ice	0.00	3.78
						2" Ice	0.00	9.33
						4" Ice	0.00	27.78
121-FT								
LDF6-50A(1-1/4")	B	No	CaAa (Out Of Face)	121.00 - 87.00	1	No Ice	0.16	0.66
						1/2" Ice	0.25	1.91
						1" Ice	0.35	3.78
						2" Ice	0.55	9.33
						4" Ice	0.95	27.78
LDF6-50A(1-1/4")	B	No	CaAa (Out Of Face)	121.00 - 87.00	5	No Ice	0.00	0.66
						1/2" Ice	0.00	1.91
						1" Ice	0.00	3.78
						2" Ice	0.00	9.33
						4" Ice	0.00	27.78
LDF6-50A(1-1/4")	B	No	CaAa (Out Of Face)	87.00 - 0.00	6	No Ice	0.00	0.66
						1/2" Ice	0.00	1.91
						1" Ice	0.00	3.78
						2" Ice	0.00	9.33
						4" Ice	0.00	27.78
FB-L98B-002-75000(3/8")	B	No	CaAa (Out Of Face)	121.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.60
						1" Ice	0.00	1.76
						2" Ice	0.00	5.91
						4" Ice	0.00	21.53
WR-VG86ST-BRD(3/4)	B	No	CaAa (Out Of Face)	121.00 - 0.00	2	No Ice	0.00	0.59
						1/2" Ice	0.00	1.37
						1" Ice	0.00	2.76
						2" Ice	0.00	7.37
						4" Ice	0.00	23.92
107-FT								
LDF7-50A(1-5/8")	C	No	Inside Pole	107.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
97-FT								
LDF7-50A(1-5/8")	C	No	Inside Pole	97.00 - 0.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF6-50A(1-1/4")	C	No	Inside Pole	97.00 - 0.00	6	1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
						No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
**								
3/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	60.50 - 0.00	1	No Ice	0.13	0.00
						1/2" Ice	0.24	0.00
						1" Ice	0.35	0.00
						2" Ice	0.57	0.00
						4" Ice	1.01	0.00
3/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	82.00 - 72.00	1	No Ice	0.13	0.00
						1/2" Ice	0.24	0.00
						1" Ice	0.35	0.00
						2" Ice	0.57	0.00
						4" Ice	1.01	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	130.00-110.00	A	0.000	0.000	0.000	0.000	0
		B	0.000	0.000	0.000	1.705	0
		C	0.000	0.000	0.000	7.128	0
L2	110.00-81.00	A	0.000	0.000	0.000	0.000	0
		B	0.000	0.000	0.000	5.425	0
		C	0.000	0.000	0.000	11.609	1
L3	81.00-70.00	A	0.000	0.000	0.000	0.000	0
		B	0.000	0.000	0.000	3.410	0
		C	0.000	0.000	0.000	5.481	0
L4	70.00-59.50	A	0.000	0.000	0.000	0.000	0
		B	0.000	0.000	0.000	3.255	0
		C	0.000	0.000	0.000	4.283	0
L5	59.50-45.50	A	0.000	0.000	0.000	0.000	0
		B	0.000	0.000	0.000	4.340	0
		C	0.000	0.000	0.000	7.294	0
L6	45.50-34.08	A	0.000	0.000	0.000	0.000	0
		B	0.000	0.000	0.000	3.540	0
		C	0.000	0.000	0.000	5.950	0
L7	34.08-20.50	A	0.000	0.000	0.000	0.000	0
		B	0.000	0.000	0.000	4.210	0
		C	0.000	0.000	0.000	7.075	0
L8	20.50-0.00	A	0.000	0.000	0.000	0.000	0
		B	0.000	0.000	0.000	6.355	0
		C	0.000	0.000	0.000	10.681	1

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	130.00-110.00	A	1.167	0.000	0.000	0.000	0.000	0
		B		0.000	0.000	0.000	4.272	0
		C		0.000	0.000	0.000	15.529	1
L2	110.00-81.00	A	1.135	0.000	0.000	0.000	0.000	0
		B		0.000	0.000	0.000	13.368	1
		C		0.000	0.000	0.000	25.024	2
L3	81.00-70.00	A	1.104	0.000	0.000	0.000	0.000	0
		B		0.000	0.000	0.000	8.269	1

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		C		0.000	0.000	0.000	12.548	1
L4	70.00-59.50	A	1.084	0.000	0.000	0.000	0.000	0
		B		0.000	0.000	0.000	7.893	1
		C		0.000	0.000	0.000	9.166	1
L5	59.50-45.50	A	1.057	0.000	0.000	0.000	0.000	0
		B		0.000	0.000	0.000	10.259	1
		C		0.000	0.000	0.000	16.501	1
L6	45.50-34.08	A	1.022	0.000	0.000	0.000	0.000	0
		B		0.000	0.000	0.000	8.211	1
		C		0.000	0.000	0.000	13.215	1
L7	34.08-20.50	A	1.000	0.000	0.000	0.000	0.000	0
		B		0.000	0.000	0.000	9.764	1
		C		0.000	0.000	0.000	15.715	1
L8	20.50-0.00	A	1.000	0.000	0.000	0.000	0.000	0
		B		0.000	0.000	0.000	14.555	2
		C		0.000	0.000	0.000	23.436	1

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	130.00-110.00	-0.250	0.243	-0.347	0.367
L2	110.00-81.00	-0.199	0.325	-0.262	0.515
L3	81.00-70.00	-0.174	0.432	-0.247	0.697
L4	70.00-59.50	-0.096	0.406	-0.087	0.668
L5	59.50-45.50	-0.205	0.465	-0.313	0.774
L6	45.50-34.08	-0.210	0.477	-0.325	0.802
L7	34.08-20.50	-0.213	0.485	-0.335	0.827
L8	20.50-0.00	-0.219	0.497	-0.348	0.860

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
APXV18-206517S-C w/ Mount Pipe	A	From Face	1.00 0	0.000	128.00	No Ice	5.40	4.70	0
			0			1/2" Ice	5.96	5.86	0
						1" Ice	6.48	6.73	0
						2" Ice	7.55	8.51	0
						4" Ice	9.92	12.28	1
APXV18-206517S-C w/ Mount Pipe	B	From Face	1.00 0	0.000	128.00	No Ice	5.40	4.70	0
			0			1/2" Ice	5.96	5.86	0
						1" Ice	6.48	6.73	0
						2" Ice	7.55	8.51	0
						4" Ice	9.92	12.28	1
APXV18-206517S-C w/ Mount Pipe	C	From Face	1.00 0	0.000	128.00	No Ice	5.40	4.70	0
			0			1/2" Ice	5.96	5.86	0
						1" Ice	6.48	6.73	0
						2" Ice	7.55	8.51	0
						4" Ice	9.92	12.28	1
Side Arm Mount [SO 102-3]	C	From Face	0.00 0	0.000	128.00	No Ice	3.00	3.00	0
			-2			1/2" Ice	3.48	3.48	0
							3.96	3.96	0

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	4.92	4.92	0
						2" Ice	6.84	6.84	0
						4" Ice			
**									
800 10121 w/ Mount Pipe	A	From Face	4.00 0 -1	0.000	121.00	No Ice	5.69	4.60	0
						1/2" Ice	6.18	5.35	0
						1" Ice	6.68	6.05	0
						2" Ice	7.70	7.53	0
						4" Ice	9.86	10.83	1
800 10121 w/ Mount Pipe	B	From Face	4.00 0 -1	0.000	121.00	No Ice	5.69	4.60	0
						1/2" Ice	6.18	5.35	0
						1" Ice	6.68	6.05	0
						2" Ice	7.70	7.53	0
						4" Ice	9.86	10.83	1
800 10121 w/ Mount Pipe	C	From Face	4.00 0 -1	0.000	121.00	No Ice	5.69	4.60	0
						1/2" Ice	6.18	5.35	0
						1" Ice	6.68	6.05	0
						2" Ice	7.70	7.53	0
						4" Ice	9.86	10.83	1
(2) LGP21401	A	From Face	4.00 0 -1	0.000	121.00	No Ice	1.29	0.23	0
						1/2" Ice	1.45	0.31	0
						1" Ice	1.61	0.40	0
						2" Ice	1.97	0.61	0
						4" Ice	2.79	1.12	0
(2) LGP21401	B	From Face	4.00 0 -1	0.000	121.00	No Ice	1.29	0.23	0
						1/2" Ice	1.45	0.31	0
						1" Ice	1.61	0.40	0
						2" Ice	1.97	0.61	0
						4" Ice	2.79	1.12	0
(2) LGP21401	C	From Face	4.00 0 -1	0.000	121.00	No Ice	1.29	0.23	0
						1/2" Ice	1.45	0.31	0
						1" Ice	1.61	0.40	0
						2" Ice	1.97	0.61	0
						4" Ice	2.79	1.12	0
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Face	4.00 0 -1	0.000	121.00	No Ice	8.50	6.30	0
						1/2" Ice	9.15	7.48	0
						1" Ice	9.77	8.37	0
						2" Ice	11.03	10.18	0
						4" Ice	13.68	14.02	1
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Face	4.00 0 -1	0.000	121.00	No Ice	8.50	6.30	0
						1/2" Ice	9.15	7.48	0
						1" Ice	9.77	8.37	0
						2" Ice	11.03	10.18	0
						4" Ice	13.68	14.02	1
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Face	4.00 0 -1	0.000	121.00	No Ice	8.50	6.30	0
						1/2" Ice	9.15	7.48	0
						1" Ice	9.77	8.37	0
						2" Ice	11.03	10.18	0
						4" Ice	13.68	14.02	1
DC6-48-60-18-8F	A	From Face	4.00 0 -1	0.000	121.00	No Ice	1.27	1.27	0
						1/2" Ice	1.46	1.46	0
						1" Ice	1.66	1.66	0
						2" Ice	2.09	2.09	0
						4" Ice	3.10	3.10	0
(2) RRUS-11	A	From Face	4.00	0.000	121.00	No Ice	3.25	1.37	0

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			1/2"	3.49	1.55	0
			-2			Ice	3.74	1.74	0
						1" Ice	4.27	2.14	0
						2" Ice	5.43	3.04	0
						4" Ice			
(2) RRUS-11	B	From Face	4.00	0.000	121.00	No Ice	3.25	1.37	0
			0			1/2"	3.49	1.55	0
			-2			Ice	3.74	1.74	0
						1" Ice	4.27	2.14	0
						2" Ice	5.43	3.04	0
						4" Ice			
(2) RRUS-11	C	From Face	4.00	0.000	121.00	No Ice	3.25	1.37	0
			0			1/2"	3.49	1.55	0
			-2			Ice	3.74	1.74	0
						1" Ice	4.27	2.14	0
						2" Ice	5.43	3.04	0
						4" Ice			
T-Arm Mount [TA 601-3]	C	None		0.000	121.00	No Ice	10.90	10.90	1
						1/2"	14.65	14.65	1
						Ice	18.40	18.40	1
						1" Ice	25.90	25.90	2
						2" Ice	40.90	40.90	2
						4" Ice			
Side Arm Mount [SO 102-3]	C	From Face	0.00	0.000	121.00	No Ice	3.00	3.00	0
			0			1/2"	3.48	3.48	0
			-2			Ice	3.96	3.96	0
						1" Ice	4.92	4.92	0
						2" Ice	6.84	6.84	0
						4" Ice			
**									
(2) DB844G65ZAXY w/ Mount Pipe	A	From Face	4.00	0.000	107.00	No Ice	4.90	4.92	0
			0			1/2"	5.35	5.60	0
			2			Ice	5.80	6.28	0
						1" Ice	6.73	7.71	0
						2" Ice	8.73	10.83	1
						4" Ice			
(2) DB844G65ZAXY w/ Mount Pipe	B	From Face	4.00	0.000	107.00	No Ice	4.90	4.92	0
			0			1/2"	5.35	5.60	0
			2			Ice	5.80	6.28	0
						1" Ice	6.73	7.71	0
						2" Ice	8.73	10.83	1
						4" Ice			
(2) DB844G65ZAXY w/ Mount Pipe	C	From Face	4.00	0.000	107.00	No Ice	4.90	4.92	0
			0			1/2"	5.35	5.60	0
			2			Ice	5.80	6.28	0
						1" Ice	6.73	7.71	0
						2" Ice	8.73	10.83	1
						4" Ice			
BXA-70063/6CFx4	A	From Face	4.00	0.000	107.00	No Ice	7.73	3.76	0
			0			1/2"	8.27	4.19	0
			2			Ice	8.81	4.63	0
						1" Ice	9.93	5.53	0
						2" Ice	12.27	7.43	1
						4" Ice			
BXA-70063/6CFx4	B	From Face	4.00	0.000	107.00	No Ice	7.73	3.76	0
			0			1/2"	8.27	4.19	0
			2			Ice	8.81	4.63	0
						1" Ice	9.93	5.53	0
						2" Ice	12.27	7.43	1
						4" Ice			
BXA-70063/6CFx4	C	From Face	4.00	0.000	107.00	No Ice	7.73	3.76	0
			0			1/2"	8.27	4.19	0
			2			Ice	8.81	4.63	0
						1" Ice	9.93	5.53	0
						2" Ice	12.27	7.43	1

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
BXA-185090/8CF w/ Mount Pipe	A	From Face	4.00 0 2	0.000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.16 3.53 3.94 4.83 6.73	3.33 3.94 4.56 5.86 8.84	0 0 0 0 0
BXA-185090/8CF w/ Mount Pipe	B	From Face	4.00 0 2	0.000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.16 3.53 3.94 4.83 6.73	3.33 3.94 4.56 5.86 8.84	0 0 0 0 0
BXA-185060/8CFx2 w/ Mount Pipe	C	From Face	4.00 0 2	0.000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.29 3.68 4.08 4.99 6.95	3.10 3.75 4.39 5.72 8.64	0 0 0 0 0
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	A	From Face	4.00 0 2	0.000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.55 1.72 1.90 2.28 3.14	0.81 0.94 1.09 1.40 2.12	0 0 0 0 0
Platform Mount (LP 101-1)	C	None		0.000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	36.21 42.82 49.43 62.65 89.09	36.21 42.82 49.43 62.65 89.09	2 2 3 5 8
**									
840 10054 w/ Mount Pipe	A	From Face	4.00 0 0	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.41 5.83 6.26 7.16 9.09	2.39 2.92 3.47 4.61 7.32	0 0 0 0 1
840 10054 w/ Mount Pipe	B	From Face	4.00 0 0	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.41 5.83 6.26 7.16 9.09	2.39 2.92 3.47 4.61 7.32	0 0 0 0 1
840 10054 w/ Mount Pipe	C	From Face	4.00 0 0	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.41 5.83 6.26 7.16 9.09	2.39 2.92 3.47 4.61 7.32	0 0 0 0 1
(2) DB980H90E-M w/ Mount Pipe	A	From Face	4.00 0 0	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0 0 0 0 1
(2) DB980H90E-M w/ Mount Pipe	B	From Face	4.00 0 0	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0 0 0 0 1
(2) DB980H90E-M w/ Mount Pipe	C	From Face	4.00 0 0	0.000	97.00	No Ice 1/2" Ice	4.04 4.50 4.95	3.62 4.48 5.22	0 0 0

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	5.87	6.74	0
						2" Ice	8.05	10.00	1
						4" Ice			
WIMAX DAP HEAD	A	From Face	4.00 0 0	0.000	97.00	No Ice	1.80	0.78	0
						1/2" Ice	1.99	0.92	0
						1" Ice	2.18	1.07	0
						2" Ice	2.59	1.39	0
						4" Ice	3.51	2.14	0
WIMAX DAP HEAD	B	From Face	4.00 0 0	0.000	97.00	No Ice	1.80	0.78	0
						1/2" Ice	1.99	0.92	0
						1" Ice	2.18	1.07	0
						2" Ice	2.59	1.39	0
						4" Ice	3.51	2.14	0
WIMAX DAP HEAD	C	From Face	4.00 0 0	0.000	97.00	No Ice	1.80	0.78	0
						1/2" Ice	1.99	0.92	0
						1" Ice	2.18	1.07	0
						2" Ice	2.59	1.39	0
						4" Ice	3.51	2.14	0
Horizon Compact	A	From Face	4.00 0 4	0.000	97.00	No Ice	0.84	0.43	0
						1/2" Ice	0.97	0.52	0
						1" Ice	1.10	0.63	0
						2" Ice	1.39	0.86	0
						4" Ice	2.08	1.43	0
Horizon Compact	B	From Face	4.00 0 4	0.000	97.00	No Ice	0.84	0.43	0
						1/2" Ice	0.97	0.52	0
						1" Ice	1.10	0.63	0
						2" Ice	1.39	0.86	0
						4" Ice	2.08	1.43	0
TIMING 2000	C	From Face	4.00 0 0	0.000	97.00	No Ice	0.13	0.13	0
						1/2" Ice	0.18	0.18	0
						1" Ice	0.24	0.24	0
						2" Ice	0.38	0.38	0
						4" Ice	0.78	0.78	0
Platform Mount [LP 602-1]	C	None		0.000	97.00	No Ice	32.03	32.03	1
						1/2" Ice	38.71	38.71	2
						1" Ice	45.39	45.39	2
						2" Ice	58.75	58.75	3
						4" Ice	85.47	85.47	5
**									
(2) RFS APXV18-206516S-C-A20 w/ Mount Pipe	A	From Face	4.00 0 0	0.000	87.00	No Ice	3.76	3.20	0
						1/2" Ice	4.14	3.83	0
						1" Ice	4.57	4.47	0
						2" Ice	5.47	5.81	0
						4" Ice	7.40	8.74	1
(2) RFS APXV18-206516S-C-A20 w/ Mount Pipe	B	From Face	4.00 0 0	0.000	87.00	No Ice	3.76	3.20	0
						1/2" Ice	4.14	3.83	0
						1" Ice	4.57	4.47	0
						2" Ice	5.47	5.81	0
						4" Ice	7.40	8.74	1
(2) RFS APXV18-206516S-C-A20 w/ Mount Pipe	C	From Face	4.00 0 0	0.000	87.00	No Ice	3.76	3.20	0
						1/2" Ice	4.14	3.83	0
						1" Ice	4.57	4.47	0
						2" Ice	5.47	5.81	0
						4" Ice	7.40	8.74	1
RFS ATMAA-1412D-1A20	A	From Face	4.00	0.000	87.00	No Ice	1.17	0.47	0

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0				1/2" Ice	1.31	0.57	0
			0				1" Ice	1.47	0.69	0
							2" Ice	1.81	0.95	0
							4" Ice	2.58	1.57	0
RFS ATMAA-1412D-1A20	B	From Face	4.00		0.000	87.00	No Ice	1.17	0.47	0
			0				1/2" Ice	1.31	0.57	0
			0				1" Ice	1.47	0.69	0
							2" Ice	1.81	0.95	0
							4" Ice	2.58	1.57	0
RFS ATMAA-1412D-1A20	C	From Face	4.00		0.000	87.00	No Ice	1.17	0.47	0
			0				1/2" Ice	1.31	0.57	0
			0				1" Ice	1.47	0.69	0
							2" Ice	1.81	0.95	0
							4" Ice	2.58	1.57	0
ETW190VS12UB	A	From Face	4.00		0.000	87.00	No Ice	0.35	0.66	0
			0				1/2" Ice	0.44	0.78	0
			0				1" Ice	0.54	0.90	0
							2" Ice	0.77	1.17	0
							4" Ice	1.33	1.82	0
ETW190VS12UB	B	From Face	4.00		0.000	87.00	No Ice	0.35	0.66	0
			0				1/2" Ice	0.44	0.78	0
			0				1" Ice	0.54	0.90	0
							2" Ice	0.77	1.17	0
							4" Ice	1.33	1.82	0
ETW190VS12UB	C	From Face	4.00		0.000	87.00	No Ice	0.35	0.66	0
			0				1/2" Ice	0.44	0.78	0
			0				1" Ice	0.54	0.90	0
							2" Ice	0.77	1.17	0
							4" Ice	1.33	1.82	0
Side Arm Mount [SO 702-3]	C	None			0.000	87.00	No Ice	3.22	3.22	0
							1/2" Ice	4.15	4.15	0
							1" Ice	5.08	5.08	0
							2" Ice	6.94	6.94	0
							4" Ice	10.66	10.66	0

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
Andrew VHLP2.5-11	A	Paraboloid w/Shroud (HP)	From Face	4.00		0.000		97.00	2.92	No Ice	6.68	0
				0						1/2" Ice	7.07	0
				4						1" Ice	7.46	0
										2" Ice	8.23	0
										4" Ice	9.78	0
Andrew VHLP2.5-11	B	Paraboloid w/Shroud (HP)	From Face	4.00		0.000		97.00	2.92	No Ice	6.68	0
				0						1/2" Ice	7.07	0
				4						1" Ice	7.46	0
										2" Ice	8.23	0
										4" Ice	9.78	0

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 130.00-110.00	119.36	1.444	23.66	21.708	A	0.000	21.708	21.708	100.00	0.000	0.000
					B	0.000	21.708		100.00	0.000	1.705
					C	0.000	21.708		100.00	0.000	7.128
L2 110.00-81.00	94.58	1.351	22.13	46.284	A	0.000	46.284	46.284	100.00	0.000	0.000
					B	0.000	46.284		100.00	0.000	5.425
					C	0.000	46.284		100.00	0.000	11.609
L3 81.00-70.00	75.40	1.266	20.75	22.142	A	0.000	22.142	22.142	100.00	0.000	0.000
					B	0.000	22.142		100.00	0.000	3.410
					C	0.000	22.142		100.00	0.000	5.481
L4 70.00-59.50	64.66	1.212	19.86	22.970	A	0.000	22.970	22.970	100.00	0.000	0.000
					B	0.000	22.970		100.00	0.000	3.255
					C	0.000	22.970		100.00	0.000	4.283
L5 59.50-45.50	52.36	1.141	18.69	34.309	A	0.000	34.309	34.309	100.00	0.000	0.000
					B	0.000	34.309		100.00	0.000	4.340
					C	0.000	34.309		100.00	0.000	7.294
L6 45.50-34.08	39.71	1.054	17.27	31.012	A	0.000	31.012	31.012	100.00	0.000	0.000
					B	0.000	31.012		100.00	0.000	3.540
					C	0.000	31.012		100.00	0.000	5.950
L7 34.08-20.50	27.18	1	16.38	39.627	A	0.000	39.627	39.627	100.00	0.000	0.000
					B	0.000	39.627		100.00	0.000	4.210
					C	0.000	39.627		100.00	0.000	7.075
L8 20.50-0.00	10.03	1	16.38	67.206	A	0.000	67.206	67.206	100.00	0.000	0.000
					B	0.000	67.206		100.00	0.000	6.355
					C	0.000	67.206		100.00	0.000	10.681

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_z	q_z psf	t_z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 130.00-110.00	119.36	1.444	2.92	1.167	25.598	A	0.000	25.598	25.598	100.00	0.000	0.000
						B	0.000	25.598		100.00	0.000	4.272
						C	0.000	25.598		100.00	0.000	15.529
L2 110.00-81.00	94.58	1.351	2.73	1.135	51.769	A	0.000	51.769	51.769	100.00	0.000	0.000
						B	0.000	51.769		100.00	0.000	13.368
						C	0.000	51.769		100.00	0.000	25.024
L3 81.00-70.00	75.40	1.266	2.56	1.104	24.167	A	0.000	24.167	24.167	100.00	0.000	0.000
						B	0.000	24.167		100.00	0.000	8.269
						C	0.000	24.167		100.00	0.000	12.548
L4 70.00-59.50	64.66	1.212	2.45	1.084	24.903	A	0.000	24.903	24.903	100.00	0.000	0.000
						B	0.000	24.903		100.00	0.000	7.893
						C	0.000	24.903		100.00	0.000	9.166
L5 59.50-45.50	52.36	1.141	2.31	1.057	36.775	A	0.000	36.775	36.775	100.00	0.000	0.000
						B	0.000	36.775		100.00	0.000	10.259
						C	0.000	36.775		100.00	0.000	16.501
L6 45.50-34.08	39.71	1.054	2.13	1.022	32.958	A	0.000	32.958	32.958	100.00	0.000	0.000
						B	0.000	32.958		100.00	0.000	8.211
						C	0.000	32.958		100.00	0.000	13.215
L7 34.08-20.50	27.18	1	2.02	1.000	41.941	A	0.000	41.941	41.941	100.00	0.000	0.000
						B	0.000	41.941		100.00	0.000	9.764
						C	0.000	41.941		100.00	0.000	15.715
L8 20.50-0.00	10.03	1	2.02	1.000	70.622	A	0.000	70.622	70.622	100.00	0.000	0.000
						B	0.000	70.622		100.00	0.000	14.555

Section Elevation ft	z ft	K_z	q_z psf	t_z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	0.000	70.622		100.00	0.000	23.436

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 130.00-110.00	119.36	1.444	9.24	21.708	A	0.000	21.708	21.708	100.00	0.000	0.000
					B	0.000	21.708		100.00	0.000	1.705
					C	0.000	21.708		100.00	0.000	7.128
L2 110.00-81.00	94.58	1.351	8.65	46.284	A	0.000	46.284	46.284	100.00	0.000	0.000
					B	0.000	46.284		100.00	0.000	5.425
					C	0.000	46.284		100.00	0.000	11.609
L3 81.00-70.00	75.40	1.266	8.10	22.142	A	0.000	22.142	22.142	100.00	0.000	0.000
					B	0.000	22.142		100.00	0.000	3.410
					C	0.000	22.142		100.00	0.000	5.481
L4 70.00-59.50	64.66	1.212	7.76	22.970	A	0.000	22.970	22.970	100.00	0.000	0.000
					B	0.000	22.970		100.00	0.000	3.255
					C	0.000	22.970		100.00	0.000	4.283
L5 59.50-45.50	52.36	1.141	7.30	34.309	A	0.000	34.309	34.309	100.00	0.000	0.000
					B	0.000	34.309		100.00	0.000	4.340
					C	0.000	34.309		100.00	0.000	7.294
L6 45.50-34.08	39.71	1.054	6.75	31.012	A	0.000	31.012	31.012	100.00	0.000	0.000
					B	0.000	31.012		100.00	0.000	3.540
					C	0.000	31.012		100.00	0.000	5.950
L7 34.08-20.50	27.18	1	6.40	39.627	A	0.000	39.627	39.627	100.00	0.000	0.000
					B	0.000	39.627		100.00	0.000	4.210
					C	0.000	39.627		100.00	0.000	7.075
L8 20.50-0.00	10.03	1	6.40	67.206	A	0.000	67.206	67.206	100.00	0.000	0.000
					B	0.000	67.206		100.00	0.000	6.355
					C	0.000	67.206		100.00	0.000	10.681

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

Comb. No.	Description
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	130 - 110	Pole	Max Tension	11	0	0	0
			Max. Compression	14	-6	0	0
			Max. Mx	11	-2	56	0
			Max. My	8	-2	0	-56
			Max. Vy	11	-5	56	0
			Max. Vx	8	5	0	-56
			Max. Torque	2			0
L2	110 - 81	Pole	Max Tension	1	0	0	0
			Max. Compression	14	-21	1	-1
			Max. Mx	11	-8	408	0
			Max. My	8	-8	0	-404
			Max. Vy	11	-16	408	0
			Max. Vx	8	16	0	-404
			Max. Torque	9			-1
L3	81 - 70	Pole	Max Tension	1	0	0	0
			Max. Compression	14	-23	0	-1
			Max. Mx	11	-9	522	0
			Max. My	8	-9	-1	-517
			Max. Vy	11	-17	522	0
			Max. Vx	8	16	-1	-517
			Max. Torque	9			-1
L4	70 - 59.5	Pole	Max Tension	1	0	0	0
			Max. Compression	14	-28	0	-3
			Max. Mx	11	-11	773	0
			Max. My	8	-11	-1	-766
			Max. Vy	11	-18	773	0
			Max. Vx	8	18	-1	-766
			Max. Torque	9			-1
L5	59.5 - 45.5	Pole	Max Tension	1	0	0	0
			Max. Compression	14	-32	-1	-4
			Max. Mx	11	-14	1035	0
			Max. My	8	-14	-2	-1026
			Max. Vy	5	19	-1035	-3
			Max. Vx	8	19	-2	-1026
			Max. Torque	9			-1
L6	45.5 - 34.08	Pole	Max Tension	1	0	0	0
			Max. Compression	14	-34	-1	-4
			Max. Mx	11	-15	1164	0
			Max. My	8	-15	-2	-1154
			Max. Vy	5	20	-1164	-3
			Max. Vx	8	20	-2	-1154
			Max. Torque	9			-1
L7	34.08 - 20.5	Pole	Max Tension	1	0	0	0
			Max. Compression	14	-41	-2	-6
			Max. Mx	5	-20	-1552	-5

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	8	-20	-2	-1539
			Max. Vy	5	22	-1552	-5
			Max. Vx	8	22	-2	-1539
			Max. Torque	9			-1
L8	20.5 - 0	Pole	Max Tension	1	0	0	0
			Max. Compression	14	-49	-3	-8
			Max. Mx	5	-24	-2021	-6
			Max. My	8	-24	-3	-2006
			Max. Vy	5	24	-2021	-6
			Max. Vx	8	24	-3	-2006
			Max. Torque	9			-1

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	49	0	0
	Max. H_x	11	24	24	0
	Max. H_z	2	24	0	24
	Max. M_x	2	2001	0	24
	Max. M_z	5	2021	-24	0
	Max. Torsion	3	1	-12	21
	Min. Vert	11	24	24	0
	Min. H_x	5	24	-24	0
	Min. H_z	8	24	0	-24
	Min. M_x	8	-2006	0	-24
	Min. M_z	11	-2021	24	0
	Min. Torsion	9	-1	12	-21

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	24	0	0	1	0	0
Dead+Wind 0 deg - No Ice	24	0	-24	-2001	3	-1
Dead+Wind 30 deg - No Ice	24	12	-21	-1730	-1006	-1
Dead+Wind 60 deg - No Ice	24	21	-12	-987	-1752	-1
Dead+Wind 90 deg - No Ice	24	24	0	6	-2021	0
Dead+Wind 120 deg - No Ice	24	21	12	1002	-1756	0
Dead+Wind 150 deg - No Ice	24	12	21	1737	-1021	0
Dead+Wind 180 deg - No Ice	24	0	24	2006	-3	1
Dead+Wind 210 deg - No Ice	24	-12	21	1734	1016	1
Dead+Wind 240 deg - No Ice	24	-21	12	997	1752	1
Dead+Wind 270 deg - No Ice	24	-24	0	0	2021	0
Dead+Wind 300 deg - No Ice	24	-21	-12	-992	1754	0
Dead+Wind 330 deg - No Ice	24	-12	-21	-1733	1011	0
Dead+Ice+Temp	49	0	0	8	-3	0
Dead+Wind 0 deg+Ice+Temp	49	0	-4	-353	-3	0
Dead+Wind 30 deg+Ice+Temp	49	2	-3	-305	-185	0
Dead+Wind 60 deg+Ice+Temp	49	4	-2	-171	-319	0
Dead+Wind 90 deg+Ice+Temp	49	4	0	9	-367	0
Dead+Wind 120 deg+Ice+Temp	49	4	2	188	-319	0
Dead+Wind 150 deg+Ice+Temp	49	2	4	321	-187	0

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 180 deg+Ice+Temp	49	0	4	369	-4	0
Dead+Wind 210 deg+Ice+Temp	49	-2	3	320	180	0
Dead+Wind 240 deg+Ice+Temp	49	-4	2	188	312	0
Dead+Wind 270 deg+Ice+Temp	49	-4	0	8	361	0
Dead+Wind 300 deg+Ice+Temp	49	-4	-2	-172	313	0
Dead+Wind 330 deg+Ice+Temp	49	-2	-3	-305	179	0
Dead+Wind 0 deg - Service	24	0	-9	-782	1	0
Dead+Wind 30 deg - Service	24	5	-8	-676	-394	0
Dead+Wind 60 deg - Service	24	8	-5	-386	-685	0
Dead+Wind 90 deg - Service	24	9	0	3	-791	0
Dead+Wind 120 deg - Service	24	8	5	393	-687	0
Dead+Wind 150 deg - Service	24	5	8	680	-400	0
Dead+Wind 180 deg - Service	24	0	9	785	-1	0
Dead+Wind 210 deg - Service	24	-5	8	679	397	0
Dead+Wind 240 deg - Service	24	-8	5	391	685	0
Dead+Wind 270 deg - Service	24	-9	0	1	790	0
Dead+Wind 300 deg - Service	24	-8	-5	-388	686	0
Dead+Wind 330 deg - Service	24	-5	-8	-677	395	0

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0	-24	0	0	24	0	0.000%
2	0	-24	-24	0	24	24	0.010%
3	12	-24	-21	-12	24	21	0.000%
4	21	-24	-12	-21	24	12	0.000%
5	24	-24	0	-24	24	0	0.010%
6	21	-24	12	-21	24	-12	0.000%
7	12	-24	21	-12	24	-21	0.000%
8	0	-24	24	0	24	-24	0.010%
9	-12	-24	21	12	24	-21	0.000%
10	-21	-24	12	21	24	-12	0.000%
11	-24	-24	0	24	24	0	0.010%
12	-21	-24	-12	21	24	12	0.000%
13	-12	-24	-21	12	24	21	0.000%
14	0	-49	0	0	49	0	0.001%
15	0	-49	-4	0	49	4	0.001%
16	2	-49	-3	-2	49	3	0.001%
17	4	-49	-2	-4	49	2	0.001%
18	4	-49	0	-4	49	0	0.001%
19	4	-49	2	-4	49	-2	0.001%
20	2	-49	4	-2	49	-4	0.001%
21	0	-49	4	0	49	-4	0.001%
22	-2	-49	3	2	49	-3	0.001%
23	-4	-49	2	4	49	-2	0.001%
24	-4	-49	0	4	49	0	0.001%
25	-4	-49	-2	4	49	2	0.001%
26	-2	-49	-4	2	49	3	0.001%
27	0	-24	-9	0	24	9	0.006%
28	5	-24	-8	-5	24	8	0.003%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
29	8	-24	-5	-8	24	5	0.003%
30	9	-24	0	-9	24	0	0.006%
31	8	-24	5	-8	24	-5	0.003%
32	5	-24	8	-5	24	-8	0.003%
33	0	-24	9	0	24	-9	0.006%
34	-5	-24	8	5	24	-8	0.003%
35	-8	-24	5	8	24	-5	0.003%
36	-9	-24	0	9	24	0	0.006%
37	-8	-24	-5	8	24	5	0.003%
38	-5	-24	-8	5	24	8	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	17	0.00009558	0.00012245
3	Yes	22	0.00000001	0.00012593
4	Yes	22	0.00000001	0.00013133
5	Yes	17	0.00009545	0.00010417
6	Yes	22	0.00000001	0.00013008
7	Yes	22	0.00000001	0.00013208
8	Yes	17	0.00009555	0.00011256
9	Yes	22	0.00000001	0.00013473
10	Yes	22	0.00000001	0.00012722
11	Yes	17	0.00009544	0.00011220
12	Yes	22	0.00000001	0.00013033
13	Yes	22	0.00000001	0.00013033
14	Yes	11	0.00000001	0.00002105
15	Yes	19	0.00011910	0.00006645
16	Yes	19	0.00011893	0.00007438
17	Yes	19	0.00011889	0.00007503
18	Yes	19	0.00011895	0.00006840
19	Yes	19	0.00011882	0.00007766
20	Yes	19	0.00011884	0.00007771
21	Yes	19	0.00011899	0.00006906
22	Yes	19	0.00011893	0.00007750
23	Yes	19	0.00011897	0.00007698
24	Yes	19	0.00011913	0.00006814
25	Yes	19	0.00011905	0.00007476
26	Yes	19	0.00011903	0.00007448
27	Yes	17	0.00010224	0.00005788
28	Yes	18	0.00005685	0.00009981
29	Yes	18	0.00005685	0.00011453
30	Yes	17	0.00010221	0.00005712
31	Yes	18	0.00005683	0.00010793
32	Yes	18	0.00005683	0.00011118
33	Yes	17	0.00010222	0.00005761
34	Yes	18	0.00005684	0.00011968
35	Yes	18	0.00005684	0.00010248
36	Yes	17	0.00010222	0.00005753
37	Yes	18	0.00005685	0.00011039
38	Yes	18	0.00005685	0.00010901

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 110	40.79	36	2.915	0.009
L2	110 - 81	28.79	36	2.733	0.008
L3	81 - 70	14.54	31	1.851	0.003
L4	74 - 59.5	11.97	31	1.665	0.002
L5	59.5 - 45.5	7.46	31	1.251	0.001
L6	45.5 - 34.08	4.30	31	0.909	0.001
L7	39 - 20.5	3.17	31	0.757	0.001
L8	20.5 - 0	0.85	31	0.406	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
128.00	APXV18-206517S-C w/ Mount Pipe	36	39.56	2.908	0.009	11245
121.00	800 10121 w/ Mount Pipe	36	35.28	2.872	0.009	6247
107.00	(2) DB844G65ZAXY w/ Mount Pipe	36	27.09	2.666	0.008	2576
101.00	Andrew VHLP2.5-11	36	23.83	2.500	0.006	2203
97.00	840 10054 w/ Mount Pipe	36	21.76	2.372	0.006	2010
87.00	(2) RFS APXV18-206516S-C-A20 w/ Mount Pipe	36	17.04	2.035	0.004	1648

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 110	103.88	11	7.424	0.024
L2	110 - 81	73.38	11	6.962	0.021
L3	81 - 70	37.12	11	4.724	0.007
L4	74 - 59.5	30.55	5	4.251	0.006
L5	59.5 - 45.5	19.05	5	3.193	0.004
L6	45.5 - 34.08	10.99	5	2.320	0.002
L7	39 - 20.5	8.09	5	1.932	0.002
L8	20.5 - 0	2.18	5	1.037	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
128.00	APXV18-206517S-C w/ Mount Pipe	11	100.76	7.405	0.024	4570
121.00	800 10121 w/ Mount Pipe	11	89.89	7.314	0.023	2538
107.00	(2) DB844G65ZAXY w/ Mount Pipe	11	69.07	6.794	0.019	1042
101.00	Andrew VHLP2.5-11	11	60.77	6.372	0.017	887
97.00	840 10054 w/ Mount Pipe	11	55.52	6.047	0.014	807
87.00	(2) RFS APXV18-206516S-C-A20 w/ Mount Pipe	11	43.48	5.192	0.009	658

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	130 - 110 (1)	TP15.525x10.525x0.188	20.00	0.00	0.0	39.00	9.284	-2	362	0.005
L2	110 - 81 (2)	TP22.779x15.525x0.25	29.00	0.00	0.0	39.00	18.136	-8	707	0.011
L3	81 - 70 (3)	TP25.531x22.779x0.377	11.00	0.00	0.0	34.06	29.317	-9	998	0.009
L4	70 - 59.5 (4)	TP27.657x23.776x0.313	14.50	0.00	0.0	39.00	27.559	-11	1075	0.010
L5	59.5 - 45.5 (5)	TP31.159x27.657x0.41	14.00	0.00	0.0	34.39	40.625	-14	1397	0.010
L6	45.5 - 34.08 (6)	TP34.015x31.159x0.405	11.42	0.00	0.0	34.45	42.203	-15	1454	0.010
L7	34.08 - 20.5 (7)	TP36.78x31.975x0.425	18.50	0.00	0.0	34.58	47.518	-18	1643	0.011
L8	20.5 - 0 (8)	TP41.9x36.78x0.414	20.50	0.00	0.0	34.70	51.539	-22	1788	0.012

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	130 - 110 (1)	TP15.525x10.525x0.188	56	19.48	39.00	0.500	0	0.00	39.00	0.000
L2	110 - 81 (2)	TP22.779x15.525x0.25	408	49.16	39.00	1.261	0	0.00	39.00	0.000
L3	81 - 70 (3)	TP25.531x22.779x0.377	522	36.44	34.06	1.070	0	0.00	34.06	0.000
L4	70 - 59.5 (4)	TP27.657x23.776x0.313	773	50.54	39.00	1.296	0	0.00	39.00	0.000
L5	59.5 - 45.5 (5)	TP31.159x27.657x0.41	1035	40.90	34.39	1.189	0	0.00	34.39	0.000
L6	45.5 - 34.08 (6)	TP34.015x31.159x0.405	1164	41.99	34.45	1.219	0	0.00	34.45	0.000
L7	34.08 - 20.5 (7)	TP36.78x31.975x0.425	1417	42.33	34.58	1.224	0	0.00	34.58	0.000
L8	20.5 - 0 (8)	TP41.9x36.78x0.414	1758	43.43	34.70	1.252	0	0.00	34.70	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	130 - 110 (1)	TP15.525x10.525x0.188	5	0.55	26.00	0.043	0	0.01	26.00	0.001
L2	110 - 81 (2)	TP22.779x15.525x0.25	16	0.88	26.00	0.069	1	0.04	26.00	0.001
L3	81 - 70 (3)	TP25.531x22.779x0.377	17	0.57	22.70	0.051	1	0.02	22.70	0.001
L4	70 - 59.5 (4)	TP27.657x23.776x0.313	18	0.65	26.00	0.051	1	0.02	26.00	0.001
L5	59.5 - 45.5 (5)	TP31.159x27.657x0.41	19	0.48	22.92	0.042	1	0.01	22.92	0.000
L6	45.5 - 34.08 (6)	TP34.015x31.159x0.405	20	0.48	22.96	0.042	0	0.01	22.96	0.000
L7	34.08 - 20.5 (7)	TP36.78x31.975x0.425	21	0.45	23.05	0.039	0	0.00	23.05	0.000
L8	20.5 - 0 (8)	TP41.9x36.78x0.414	23	0.44	23.13	0.039	0	0.00	23.13	0.000

Pole Interaction Design Data

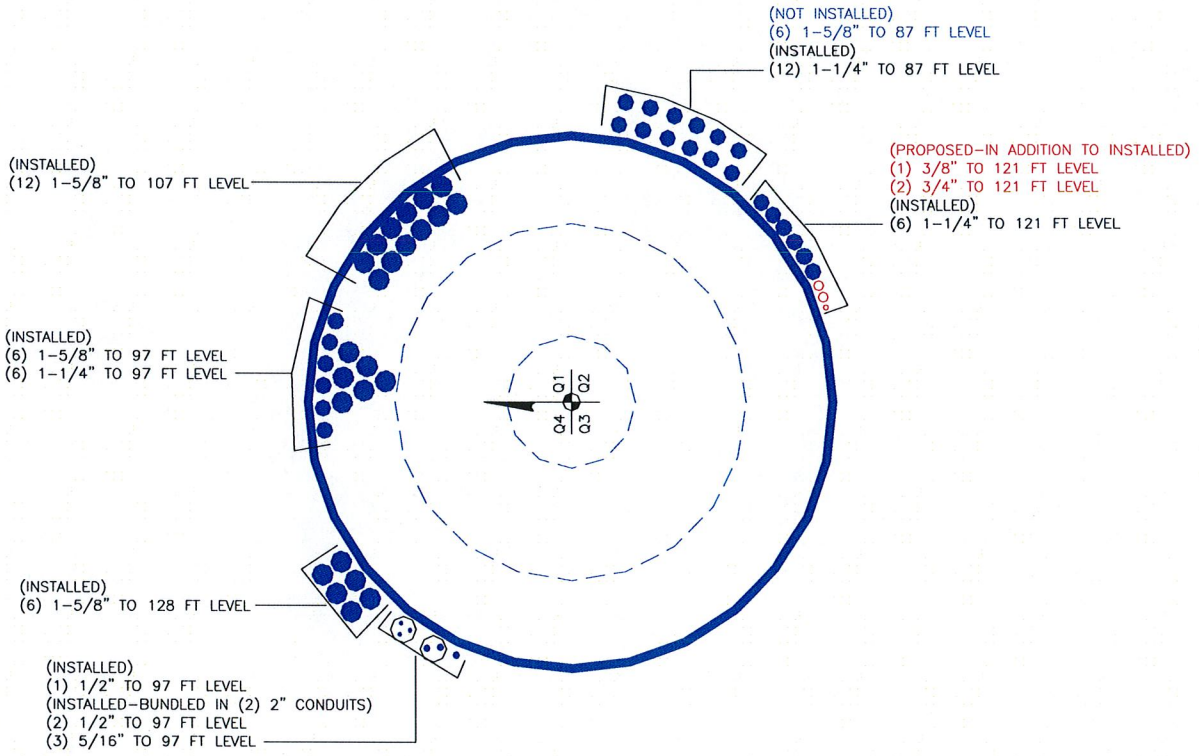
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	130 - 110 (1)	0.005	0.500	0.000	0.043	0.001	0.505 ✔	1.333	H1-3+VT ✔
L2	110 - 81 (2)	0.011	1.261	0.000	0.069	0.001	1.273 ✔	1.333	H1-3+VT ✔
L3	81 - 70 (3)	0.009	1.070	0.000	0.051	0.001	1.079 ✔	1.333	H1-3+VT ✔
L4	70 - 59.5 (4)	0.010	1.296	0.000	0.051	0.001	1.307 ✔	1.333	H1-3+VT ✔
L5	59.5 - 45.5 (5)	0.010	1.189	0.000	0.042	0.000	1.200 ✔	1.333	H1-3+VT ✔
L6	45.5 - 34.08 (6)	0.010	1.219	0.000	0.042	0.000	1.230 ✔	1.333	H1-3+VT ✔
L7	34.08 - 20.5 (7)	0.011	1.224	0.000	0.039	0.000	1.236 ✔	1.333	H1-3+VT ✔
L8	20.5 - 0 (8)	0.012	1.252	0.000	0.039	0.000	1.264 ✔	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	130 - 110	Pole	TP15.525x10.525x0.188	1	-2	483	37.9	Pass
L2	110 - 81	Pole	TP22.779x15.525x0.25	2	-8	943	95.5	Pass
L3	81 - 70	Pole	TP25.531x22.779x0.377	3	-9	1331	81.0	Pass
L4	70 - 59.5	Pole	TP27.657x23.776x0.313	4	-11	1433	98.0	Pass
L5	59.5 - 45.5	Pole	TP31.159x27.657x0.41	5	-14	1862	90.0	Pass
L6	45.5 - 34.08	Pole	TP34.015x31.159x0.405	6	-15	1938	92.3	Pass
L7	34.08 - 20.5	Pole	TP36.78x31.975x0.425	7	-18	2190	92.7	Pass
L8	20.5 - 0	Pole	TP41.9x36.78x0.414	8	-22	2384	94.8	Pass
							Summary	
						Pole (L4)	98.0	Pass
						RATING =	**98.0**	**Pass**

APPENDIX B

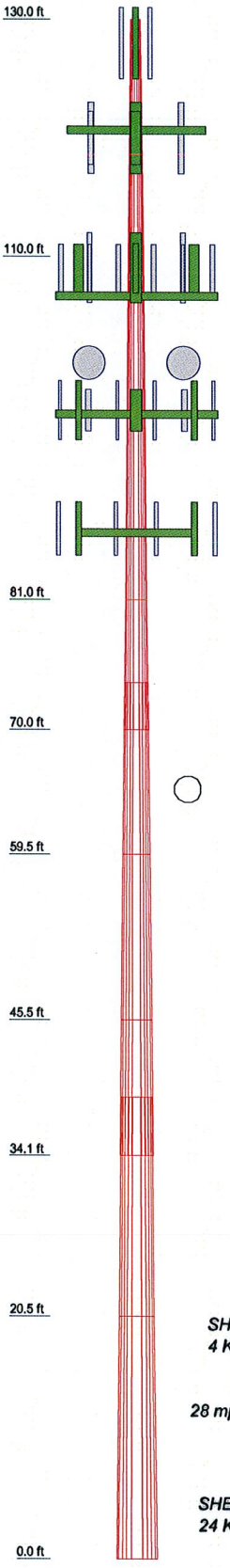
BASE LEVEL DRAWING

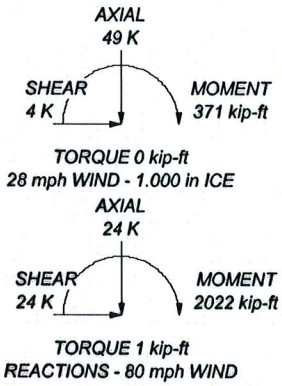


APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8
Length (ft)	20.00	29.00	11.00 / 14.50	14.50	14.00	11.42 / 18.50	18.50	20.50
Number of Sides	12	12	12	12	12	12	12	12
Thickness (in)	0.188	0.250	0.377	0.313	0.410	0.405	0.425	0.414
Socket Length (ft)			4.00			4.92		
Top Dia (in)	10.525	15.525	22.779	23.776	27.657	31.159	31.975	36.780
Bot Dia (in)	15.525	22.779	25.531	27.657	31.159	34.015	36.780	41.900
Grade	A572-65	A572-65	Reinf 56.76 ksi	Reinf 56.76 ksi	A572-65	Reinf 57.31 ksi	Reinf 57.41 ksi	Reinf 57.63 ksi / Reinf 57.83 ksi
Weight (K)	0.5	1.5	1.1	1.3	1.8	1.6	2.9	3.6





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXV18-206517S-C w/ Mount Pipe	128	(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	107
APXV18-206517S-C w/ Mount Pipe	128		
APXV18-206517S-C w/ Mount Pipe	128	Platform Mount (LP 101-1)	107
Side Arm Mount [SO 102-3]	128	840 10054 w/ Mount Pipe	97
800 10121 w/ Mount Pipe	121	840 10054 w/ Mount Pipe	97
800 10121 w/ Mount Pipe	121	840 10054 w/ Mount Pipe	97
800 10121 w/ Mount Pipe	121	(2) DB980H90E-M w/ Mount Pipe	97
(2) LGP21401	121	(2) DB980H90E-M w/ Mount Pipe	97
(2) LGP21401	121	(2) DB980H90E-M w/ Mount Pipe	97
(2) LGP21401	121	WIMAX DAP HEAD	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	WIMAX DAP HEAD	97
		WIMAX DAP HEAD	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	Horizon Compact	97
		Horizon Compact	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	TIMING 2000	97
		Platform Mount [LP 602-1]	97
DC6-48-60-18-8F	121	Andrew VHLP2.5-11	97
(2) RRUS-11	121	Andrew VHLP2.5-11	97
(2) RRUS-11	121	(2) RFS APXV18-206516S-C-A20 w/ Mount Pipe	87
(2) RRUS-11	121		
T-Arm Mount [TA 601-3]	121	RFS ATMAA-1412D-1A20	87
Side Arm Mount [SO 102-3]	121	RFS ATMAA-1412D-1A20	87
(2) DB844G65ZAXY w/ Mount Pipe	107	RFS ATMAA-1412D-1A20	87
(2) DB844G65ZAXY w/ Mount Pipe	107	ETW190VS12UB	87
(2) DB844G65ZAXY w/ Mount Pipe	107	ETW190VS12UB	87
BXA-70063/6CFx4	107	ETW190VS12UB	87
BXA-70063/6CFx4	107	Side Arm Mount [SO 702-3]	87
BXA-70063/6CFx4	107	(2) RFS APXV18-206516S-C-A20 w/ Mount Pipe	87
BXA-185090/8CF w/ Mount Pipe	107		
BXA-185090/8CF w/ Mount Pipe	107	(2) RFS APXV18-206516S-C-A20 w/ Mount Pipe	87
BXA-185060/8CFx2 w/ Mount Pipe	107		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	Reinf 57.41 ksi	57 ksi	65 ksi
Reinf 56.76 ksi	57 ksi	71 ksi	Reinf 57.63 ksi	58 ksi	73 ksi
Reinf 57.31 ksi	57 ksi	65 ksi	Reinf 57.83 ksi	58 ksi	73 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 28 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 98%

Paul J. Ford and Company
250 East Broad Street #1500
Columbus, OH 43215
Phone: (614) 221-6679
FAX: (614) 448-4105

Job: 131-Ft Monopole / HRT 100 943239			
Project: 37512-1659 / BU# 806376 / WO# 501367			
Client: Crown Castle	Drawn by: D. Scott Kramer, P.E.	App'd:	
Code: TIA/EIA-222-F	Date: 06/26/12	Scale: NTS	
Path: G:\TOWER\375_Crown_Castle\2012\37512-1659 BU 806376\37512-1659_SABRE_Reinforced.eri		Dwg No. E-1	

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

Site Data

BU#: *806376*
Site Name:
App #:

Pole Manufacturer:	Other

Reactions		
Moment:	56	ft-kips
Axial:	2	kips
Shear:	5	kips
Elevation:	110	feet

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

Bolt Data			
Qty:	10		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty: 44.00
N/A:	55	<-- Disregard	
Circle (in.):	19.45		

Plate Data		
Diam:	21.95	in
Thick, t:	1.375	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	4.99	in

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

Pole Data		
Diam:	15.53	in
Thick:	0.25	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	

Flange Bolt Results

			Rigid
Bolt Tension Capacity, B:	46.07	kips	Service, ASD
Max Bolt directly applied T:	13.62	Kips	Fty*ASIF
Min. PL "tc" for B cap. w/o Pry:	1.286	in	
Min PL "treq" for actual T w/ Pry:	0.524	in	
Min PL "t1" for actual T w/o Pry:	0.699	in	
T allowable w/o Prying:	46.07	kips	α'<0 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	13.62	kips	
Non-Prying Bolt Stress Ratio, T/B:	29.6%	Pass	

Exterior Flange Plate Results — Flexural Check

			Rigid
Compression Side Plate Stress:	10.7	ksi	Service ASD
Allowable Plate Stress:	50.0	ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	21.5%	Pass	Comp. Y.L. Length: 11.71
No Prying			
Tension Side Stress Ratio, (treq/t)^2:	14.5%	Pass	

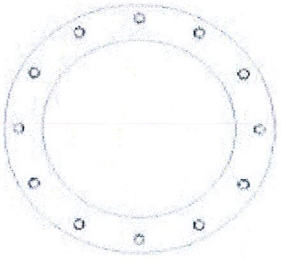
n/a

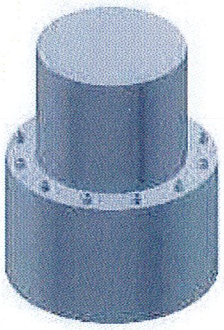
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a





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

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

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

TIA Rev F

Site Data

BU#: *806376*
Site Name:
App #:

Pole Manufacturer:	*Other*

Reactions		
Moment:	2022	ft-kips
Axial:	24	kips
Shear:	24	kips

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

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	49.88	in

Plate Data		
Diam:	55.88	in
Thick:	2.5	in
Grade:	60	ksi
Single-Rod B-eff:	11.23	in

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

Pole Data		
Diam:	41.9	in
Thick:	0.34375	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	

Anchor Rod Results

		Rigid
Maximum Rod Tension:	160.1 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	82.1% Pass	

Base Plate Results Flexural Check

		Rigid
Base Plate Stress:	35.3 ksi	Service ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	58.9% Pass	Y.L. Length: 27.06

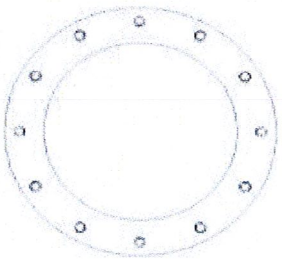
n/a

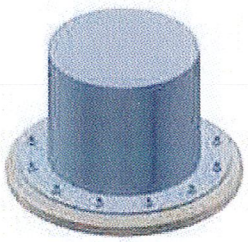
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a





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

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

Foundation Loads:

Pole weight or tower leg compression = 24 (kips)
Horizontal load at top of pier = 24 (kips)
Overturning moment at top of pier= 2022 (ft-kips)

Design criteria:

Safety factor against overturning = 1.5

Soil Properties:

Soil density = 115 (pcf)
Allowable soil bearing = 5 (ksf)
Depth to water table = 12 (ft)

Dimensions:

Pier shape (round or square) R ("R" or "S")
Pier width = 6 (ft)
Pier height above grade = 0.5 (ft)
depth to bottom of footing = 8 (ft)
Footing thickness = 3 (ft)
Footing width = 22 (ft)
Footing length = 22 (ft)

Concrete:

Concrete strength = 3 (ksi)
Rebar strength = 60 (ksi)
ultimate load factor = 1.3

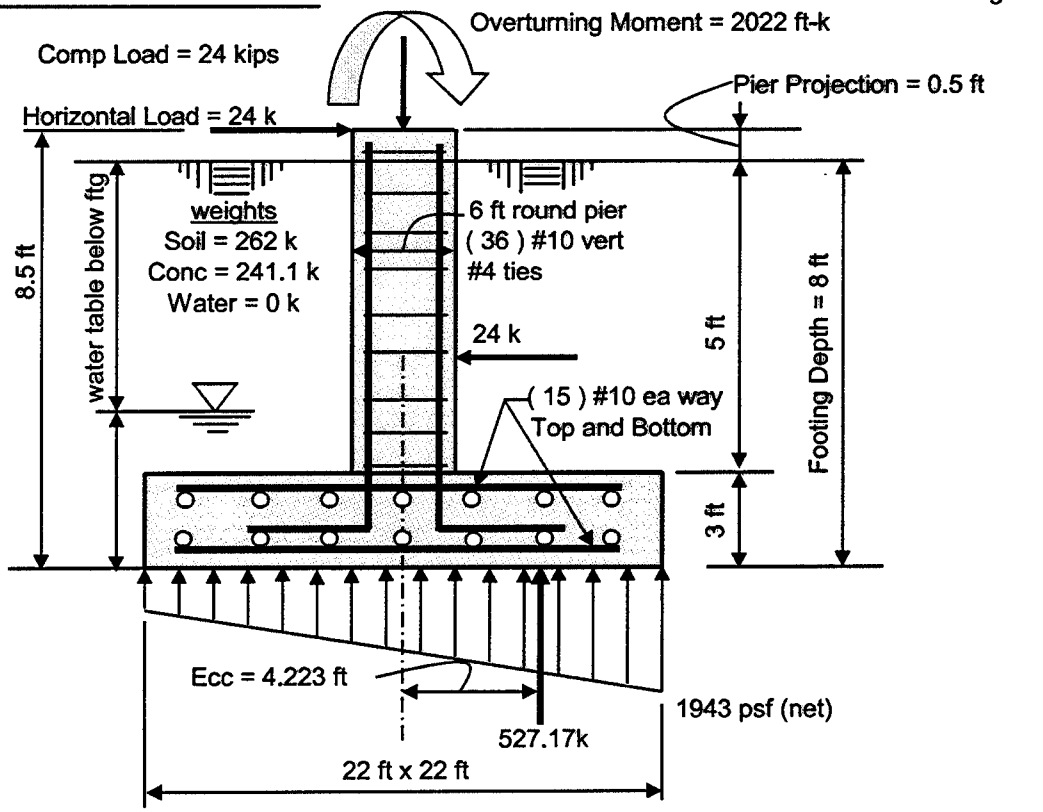
Reinforcing Steel:

	Pad	
minimum cover over rebar =	3	inches
size of pad rebar =	#10	bar
quantity of pad rebar =	15	(ea direction)

Reinforcing Steel:

	Pier	
size of vert rebar in pier=	#10	bar
vertical rebar quantity =	36	
size of pier ties =	#4	bar
minimum cover over rebar =	3	inches

Total volume of concrete = 59.5 cu yd



Summary of analysis results	
Maximum Net Soil Bearing = 1.943 ksf Allowable Net Soil Bearing = 5 ksf **Soil Bearing Stress Ratio = 0.39 Okay**	Ult Bending Shear Capacity = 110 psi Ult Bending Shear Stress = 26 psi **Bending Shear Stress Ratio = 0.24 Okay**
Ftg Overturning Resistance = 5799 ft-kips Overturning Moment = 2226 ft-kips Required Overturning Safety Factor = 1.5 Overturning Safety Factor = 2.605 **Ratio = 0.58 Okay**	Pad Bending Moment Capacity= 2595 ft-k Pad Bending Moment = 936 ft-k **Bending Moment Stress Ratio = 0.36 OK**

General Information:
==========
File Name: G:\TOWER\375_Crown_Castle\2012\37512-1659 BU 806376\37512-1659BP sabre.col
Project: 37512-1659
Column:
Code: ACI 318-08

Engineer: DSK
Units: English

Run Option: Investigation
Run Axis: X-axis

Slenderness: Not considered
Column Type: Structural

Material Properties:
==========
f'c = 3 ksi
Ec = 3122.02 ksi
Ultimate strain = 0.003 in/in
Betal = 0.85

fy = 60 ksi
Es = 29000 ksi

Section:
==========
Circular: Diameter = 72 in

Gross section area, Ag = 4071.5 in^2
Ix = 1.31917e+006 in^4
rx = 18 in
Xo = 0 in

Iy = 1.31917e+006 in^4
ry = 18 in
Yo = 0 in

Reinforcement:
==========
Bar Set: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Circular
Pattern: All Sides Equal (Cover to longitudinal reinforcement)
Total steel area: As = 45.72 in^2 at rho = 1.12%
Minimum clear spacing = 4.37 in

36 #10 Cover = 3 in

Factored Loads and Moments with Corresponding Capacities:
==========

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu	NA depth in	Dt depth in	eps_t	Phi
1	24.00	2800.00	5781.31	2.065	15.54	68.37	0.01020	0.900

*** End of output ***

CROWN CASTLE PROJECT: BU #806376; HRT 100 943239, EAST HARTFORD, 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 28 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:

1. ANY AND ALL FIELD WELDING REQUIRED ON THIS PROJECT SHALL BE PERFORMED BY AWS CERTIFIED WELDERS USING "LOW HEAT" WELDING TECHNIQUES.
2. FOR THE PURPOSES OF THIS PROJECT, "LOW HEAT" WELDING IS DEFINED AS A CAREFUL AND CONTROLLED WELDING PROCESS, PERFORMED BY EXPERIENCED AWS CERTIFIED WELDERS, SUCH THAT THE CORRECT AMOUNT OF WELD METAL IS DEPOSITED AND IS PROPERLY FUSED IN SUCH A WAY THAT EXCESSIVE AMOUNTS OF HEAT BUILDUP AT THE WELDED JOINT, DUE TO EXCESSIVE MOLTEN WELD METAL POOLING, IS AVOIDED.
3. THE "LOW HEAT" WELDING PROCESS SHALL BE SET UP SO THAT ANY FIELD WELDING ACTIVITY ON THE POLE STRUCTURE DOES NOT SCORCH OR OTHERWISE DAMAGE THE EXISTING GALVANIZED SURFACE ON THE INSIDE OF THE POLE SHAFT IN AND AROUND THE REGION OF THE WELD.
4. THE "LOW HEAT" WELDING PROCESS, USED IN CONJUNCTION WITH THE CROWN CASTLE COAX PROTECTION AND FIRE SAFETY GUIDELINES, SHALL BE SET UP SO THAT ANY FIELD WELDING ACTIVITY ON THE POLE STRUCTURE DOES NOT SCORCH AND/OR OTHERWISE DAMAGE THE EXISTING COAX CABLES THAT RUN ON THE INSIDE AND/OR OUTSIDE OF THE POLE SHAFT IN AND AROUND THE REGION OF THE WELD.
5. "LOW HEAT" WELD DEMONSTRATION REQUIRED: PRIOR TO BEGINNING THE FIELD WELDING FOR THE REINFORCEMENT WORK, THE CONTRACTOR'S AWS CERTIFIED WELDER SHALL DEMONSTRATE THE "LOW HEAT" WELDING PROCESS THAT WILL BE USED ON THIS PROJECT SO THAT CROWN CASTLE REPRESENTATIVES CAN OBSERVE AND VERIFY THAT THE PROPOSED PROCESS DOES NOT DAMAGE THE EXISTING GALVANIZED SURFACE ON THE BACK SIDE OF THE SAMPLE PLATE THAT IS BEING WELDED. THE CONTRACTOR SHALL USE TEMPERATURE MONITORING DEVICES SUCH AS THERMOCOUPLE, HEAT CRAYON, AND/OR INFRARED SENSOR TO MEASURE AND DEMONSTRATE THE TEMPERATURE OF THE STEEL ON THE BACK SURFACE IN THE REGION OF THE WELD. THE "LOW HEAT" WELD DEMONSTRATION SHALL BE CARRIED OUT ON-SITE AND USING A GALVANIZED STEEL PLATE SAMPLE WITH A THICKNESS EQUAL TO THE MINIMUM SHAFT THICKNESS THAT WILL BE REINFORCED. ONLY AFTER THE "LOW HEAT" TECHNIQUES HAVE BEEN SUCCESSFULLY DEMONSTRATED AND ARE APPROVED BY CROWN CASTLE REPRESENTATIVES, CAN THE CONTRACTOR PROCEED WITH THE FIELD WELDING ON THE STRUCTURE.
6. CAUTION: THE CONTRACTOR SHALL CAREFULLY FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE SAFETY, AND ALL OTHER SAFETY GUIDELINES WHICH ALSO INCLUDE "LOW HEAT" WELDING TECHNIQUES. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR MAINTAINING THE SAFETY AND STABILITY OF THE STRUCTURE DURING CONSTRUCTION. THE CONTRACTOR SHALL BE HELD FULLY LIABLE FOR ANY DAMAGE (INCLUDING HEAT AND FIRE DAMAGE CAUSED BY FIELD WELDING) TO THE STRUCTURE AND ANY OF ITS COMPONENTS WHICH OCCURS DURING CONSTRUCTION.

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-10058 FOR SPECIFICATION.
2. 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.
3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
4. 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.
5. 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
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

JUN 2 8 2012

SABRE SHAFT REINFORCING OPTION

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BU #806376; HRT 100 943239
EAST HARTFORD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37512-1659	ISSUE DATE OF PERMIT: 6-22-2012
DRAWN BY: B.M.S.	
CHECKED BY: D.S.K.	
APPROVED BY:	S-1B
DATE: 6-22-2012	

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 - (NOT REQUIRED)

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"

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BU #806376; HRT 100 943239
EAST HARTFORD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37512-1659	ISSUE DATE OF PERMIT: 6-22-2012
DRAWN BY: B.M.S.	
CHECKED BY: D.S.K.	
APPROVED BY:	S-2B
DATE: 6-22-2012	

37512-1659 PERM.T.DWG

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.

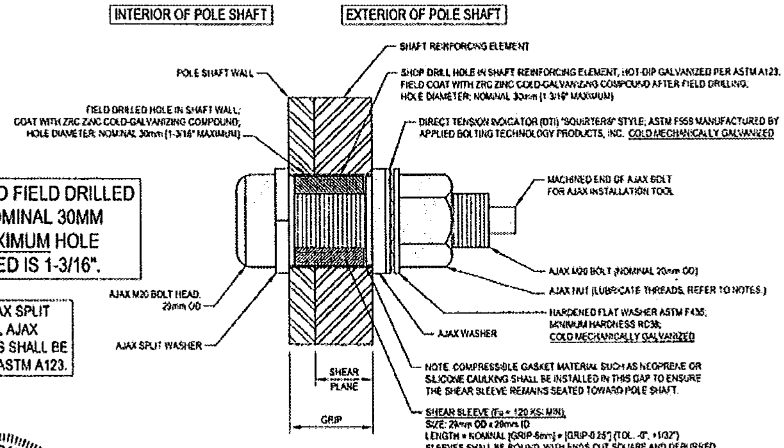
HARDENED WASHERS REQUIRED: USE A HARDENED WASHER FOR A 3/4" NOMINAL BOLT BETWEEN THE TOP OF THE DIRECT TENSION INDICATOR (DTI) WASHER AND THE NUT OF THE AJAX M20 BOLTS. HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A MINIMUM HARDNESS OF RC 38 OR HIGHER. THE HARDENED WASHERS SHALL BE MECHANICALLY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

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37512-1659 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#37512-1659), DATED 6-22-2012.

POLE SPECIFICATIONS	
POLE SHAPE TYPE:	12-SIDED POLYGON
TAPER:	0.239504 IN/FT
SHAFT STEEL:	ASTM A572 GRADE 65
BASE PL STEEL:	ASTM A633 GR. E (60 KSI)
ANCHOR RODS:	2 1/4"Ø (16) ASTM A615 GRADE 75

SHAFT SECTION DATA					
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN)	
				@ TOP	@ BOTTOM
1	20.00	0.1875		10.525	15.525
2	40.00	0.2500	48.00	15.528	29.531
3	39.92	0.3125	59.00	24.030	34.015
4	38.00	0.3438		32.158	41.900

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.

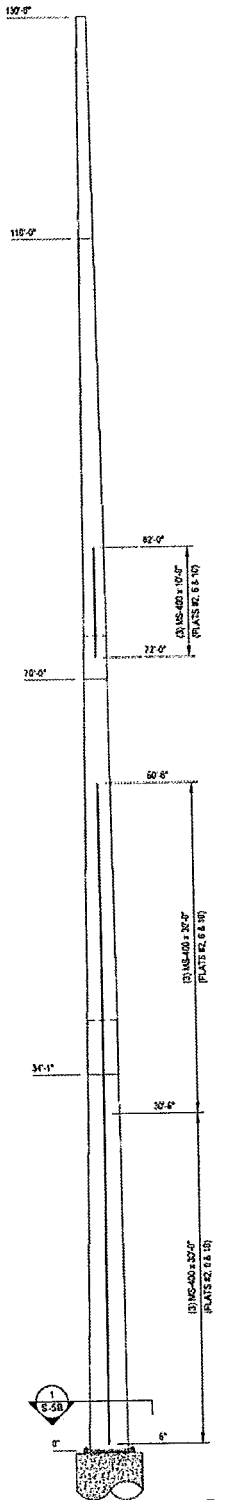
4. DTI'S REQUIRED: * ALL AJAX BOLTS SHALL BE INSTALLED USING DIRECT TENSION INDICATORS (DTI'S) AND HARDENED WASHERS. DTI'S SHALL BE THE SQUIRTER® STYLE, MADE TO ASTM F959 LATEST REVISION, AND HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A HARDNESS OF RC 38 OR HIGHER.

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.

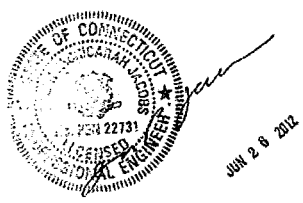
* AS OF 5/22/2012, UNTIL FURTHER NOTICE, CROWN CASTLE WILL ACCEPT AJAX BOLTS TIGHTENED USING AISC "TURN-OF-THE-NUT" METHODOLOGY. INSTALLERS SHALL FOLLOW CROWN GUIDELINES FOR AISC "TURN-OF-THE-NUT" METHOD AND ALSO PROVIDE COMPLETE INSPECTION DOCUMENTATION IN THE PIR.

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-SUL-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.



POLE ELEVATION 1 S-4B

SABRE SHAFT REINFORCING OPTION



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BU #806376; HRT 100 943239
EAST HARTFORD, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37512-1659	ISSUE DATE OF PERMIT: 6-22-2012
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CHECKED BY: D.S.K.	
APPROVED BY:	S-4B
DATE: 6-22-2012	

37512-1659 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.

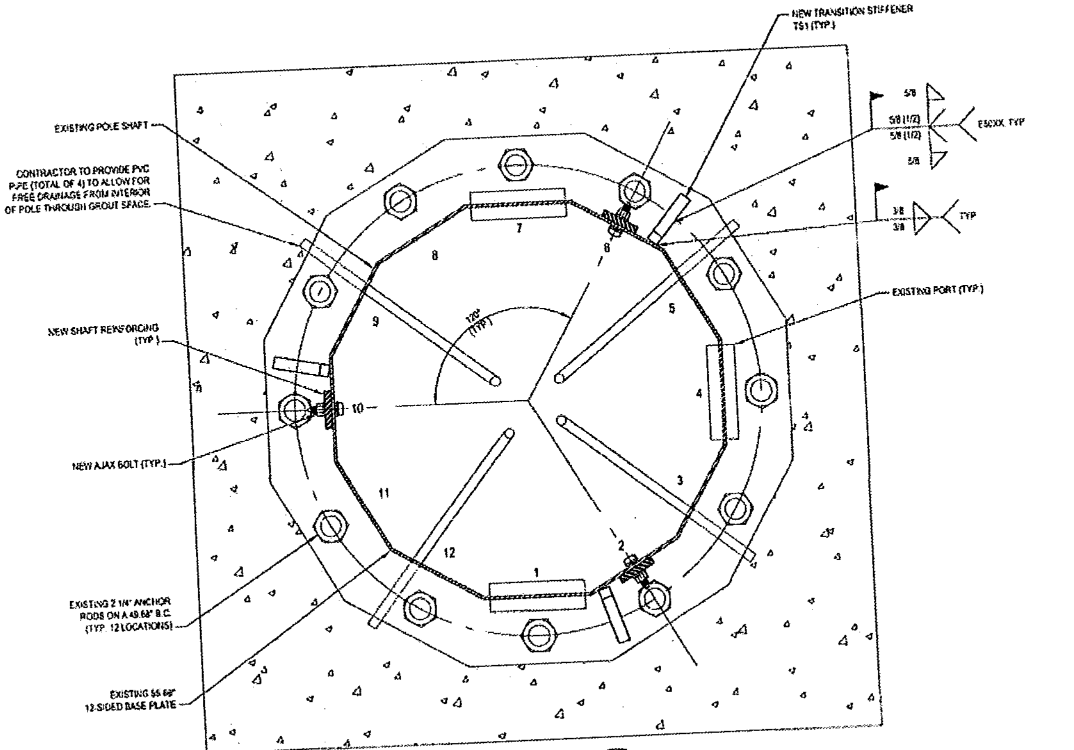
(2) AFTER CONSTRUCTION, TESTING AGENCY SHALL INSPECT ANY AND ALL FIELD WELDS AND FIELD REPAIRS IMPLEMENTED AS REQUIRED BY THE OWNER FROM THE RESULTS OF THE INSPECTION IN THE PREVIOUS NOTE (1) ABOVE.

GENERAL NOTES:

1. AJAX BOLTS ARE TO BE 20 mm Ø WITH CORRESPONDING 28 mm Ø SHEAR SLEEVE WITH MATCHING STEEL GRADE. DRILLED HOLE DIAMETERS IN REINFORCING STEEL AND EXISTING SHAFT SHALL BE 1 3/16"Ø MAX.

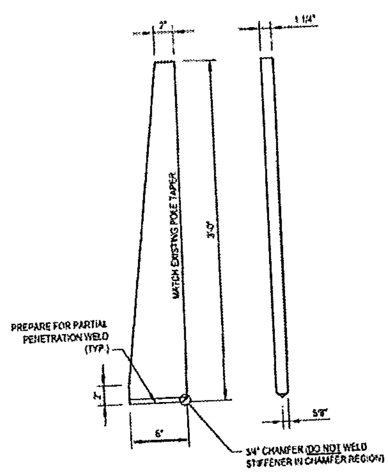
2. ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0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

3. ALL SHAFT REINFORCING IS A572 GR 65.



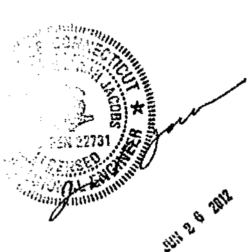
BASE PLATE (1 / S-5B)

CONTRACTOR SHALL REMOVE EXISTING GROUT UNDERNEATH BASE PLATE AND REPLACE WITH NON-SHRINK GROUT (NS GROUT BY EUCLID OR APPROVED EQUAL; 7500 PSI MIN.) BELOW EXIST. BASE PLATE AND NEW BEARING PLATES. PRIOR TO GROUTING, INSTALL FOUR 1-INCH DIAMETER PVC DRAIN PIPES AT APPROXIMATELY NINETY (90) DEGREES APART THROUGH GROUT SPACE. 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 UNDER ENTIRE SURFACE OF BASE PLATE FROM OUTSIDE EDGE TO INSIDE EDGE.



TRANSITION STIFFENER MK~TS1

(3 REQUIRED) (Fy = 65 KSI)



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MODIFICATION INSPECTION NOTES:

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

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

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

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

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

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

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

THE MI 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 IN-FIELD 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
NA	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
NA	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 A325 BOLTS AND DTI'S PER REQUIREMENTS ON SHEET S-3
ADDITIONAL TESTING AND INSPECTIONS:	
	POST-CONSTRUCTION
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

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

STATE OF CONNECTICUT
CHRISTOPHER JACOBS
No. PEN 22731
REGISTERED PROFESSIONAL ENGINEER

JUN 26 2012

SABRE SHAFT REINFORCING OPTION

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Calculated Radio Frequency Emissions

CT5276

(AWE - East Hartford South)

1455 Forbes Avenue, East Hartford, CT 06118

(a.k.a. 1441/1455 Forbes Avenue)

July 11, 2012

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List of Tables

List of Figures

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 1455 Forbes Avenue in East Hartford, CT. The coordinates of the tower are 41-43-53.3 N, 72-36-28 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	*120*	*1900*	*3*	*640*	*0.0479*	*1.0000*	*4.79%*
Cingular UMTS	*120*	*880*	*1*	*500*	*0.0125*	*0.5867*	*2.13%*
XM Satellite Radio	130	2300	2	3981	0.1694	1.0000	16.94%
Sprint	90	1900	11	126	0.0615	1.0000	6.15%
Clearwire	97	2496	2	153	0.0117	1.0000	1.17%
Clearwire	101	18000	1	211	0.0074	1.0000	0.74%
Pocket	128	2130	3	631	0.0415	1.0000	4.15%
Verizon	109	869	9	428	0.1166	0.5793	20.12%
Verizon	109	1970	7	474	0.1004	1.0000	10.04%
Verizon	109	757	1	873	0.0264	0.5047	5.24%
T-Mobile UMTS	87	2100	2	731	0.0695	1.0000	6.95%
T-Mobile GSM	87	1945	8	166	0.0631	1.0000	6.31%
AT&T UMTS	120	880	2	565	0.0028	0.5867	0.48%
AT&T UMTS	120	1900	2	1077	0.0054	1.0000	0.54%
AT&T LTE	120	734	1	1313	0.0033	0.4893	0.67%
AT&T GSM	120	880	1	283	0.0007	0.5867	0.12%
AT&T GSM	120	1900	4	646	0.0065	1.0000	0.65%
						Total	**80.27%**

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 Analysis dated June 22, 2012

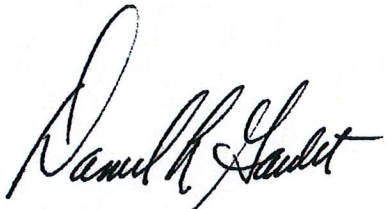
5. Conclusion

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 below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at ground level is **80.27% 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 11, 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

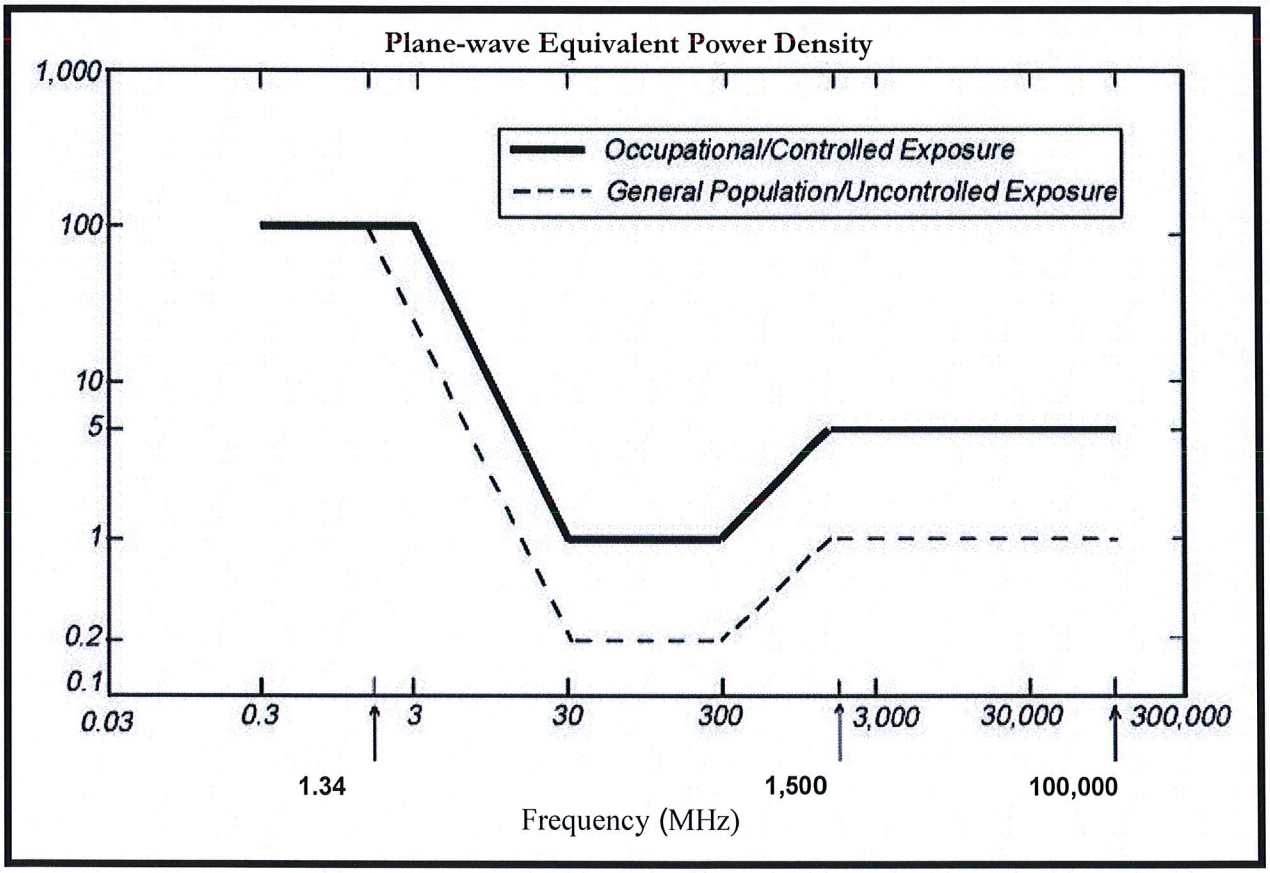
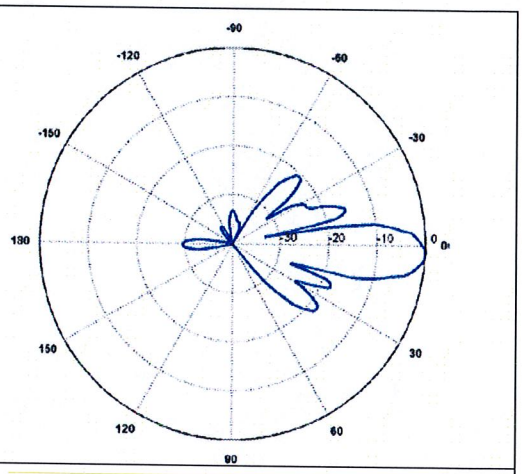


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

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

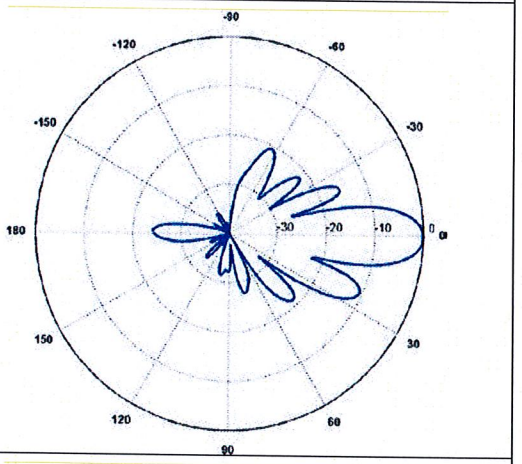
700 MHz

Manufacturer:	KMW
Model #:	AM-X-CD-16-65-00T
Frequency Band:	698-806 MHz
Gain:	13.4 dBd
Vertical Beamwidth:	12.3°
Horizontal Beamwidth:	65°
Polarization:	Dual Slant ± 45°
Size L x W x D:	72.0" x 11.8" x 5.9"



850 MHz

Manufacturer:	Kathrein
Model #:	80010121
Frequency Band:	824-896 MHz
Gain:	11.5 dBd
Vertical Beamwidth:	14.5°
Horizontal Beamwidth:	86°
Polarization:	±45°
Size L x W x D:	54.5"x10.3"x5.9"



1900 MHz

Manufacturer:	Kathrein
Model #:	80010121
Frequency Band:	1850-1990 MHz
Gain:	14.3 dBd
Vertical Beamwidth:	6.6°
Horizontal Beamwidth:	85°
Polarization:	±45°
Size L x W x D:	54.5"x10.3"x5.9"