EM-CLEARWIRE-064-100602

June 2, 2010

S. Derek Phelps, Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

ORIGINAL

Re: Notice of Exempt Modification
Clearwire Corporation Notice to make an Exempt Modification to an Existing Facility at 219 New Park Avenue, Hartford, CT
Clearwire Site Number CT-HFD0072

Dear Mr. Phelps,

Pursuant to Conn. Agency Regulations Sections 16-50j-73 and 16-50j-72(b), Clearwire Corporation (Clearwire) hereby gives notice to the Connecticut Siting Council (Council) and the City of Hartford, CT. of Clearwire's intent to make an exempt modification to an existing monopole tower (tower) located at 219 New Park Avenue, Hartford, CT. Specifically, Clearwire plans to add three (3) antennas to the tower, one (1) per sector and to add three (3) microwave dishes, one (1) per sector for backhaul at the 100' AGL. Pursuant to the Council's regulations, (Conn. Agency Regulations Section 16-50j-72(b)), Clearwire's plans do not constitute a modification subject to the Council's review because Clearwire will not change the height of the tower, will not extend the boundaries of the compound, will not increase the noise levels at the site and will not increase the total radio frequency electromagnetic radiation power density at the site to levels above applicable standards. A copy of this notice has been sent to the Mayor of the City of Hartford, CT.

Clearwire is currently developing a 4G wireless broadband network to provide high-speed wireless data and VoIP service within the State of Connecticut. Clearwire's 4G service leverages the WiMAX technology to enable enhanced wireless data communications. In order to accomplish the upgrade at this site, Clearwire plans to add three (3) WiMAX antennas, three (3) dishes and to install additional WiMAX related electronic equipment at the base of the tower.

The tower is a 108' monopole located at 219 New Park Avenue, Hartford, Connecticut (Latitude 41 45 02 N Longitude 72 42 49 W). The tower is owned by Crown Castle USA. Currently, Verizon and Nextel are located on the tower, as well as a number of other public service antennas. Presently, Clearwire is not located at the site. Clearwire's base station equipment will be located on the ground next to the pole. A site plan with the tower elevations and site plan specifications is attached.

Clearwire will add three (3) antennas, one (1) to each sector, and mount three (3) microwave dishes, one (1) above each of those antennas. The center line for the microwave dishes will be 100'. Nine coaxial cables will be added to the structure, 2 per antenna and one per microwave dish. These cables will be inside the tower and bundled. To confirm that the tower

can support these changes, Clearwire commissioned Paul J Ford & Company to perform a structural analysis of the tower and the proposed changes. According to that structural dated May 20, 2010 and attached hereto, the structure is sufficient to support the proposed loading and will not need to be modified. The tower, with the additions and the modifications will be at less than 99.9% of its capacity.

Within the existing compound, Clearwire will install one (1) WiMAX radio and power cabinet on the existing pad at the site. The new equipment will be adjacent to the existing tower. Excluding brief, construction related noise during the addition of this equipment, the proposed changes to the tower will not increase noise levels at the site.

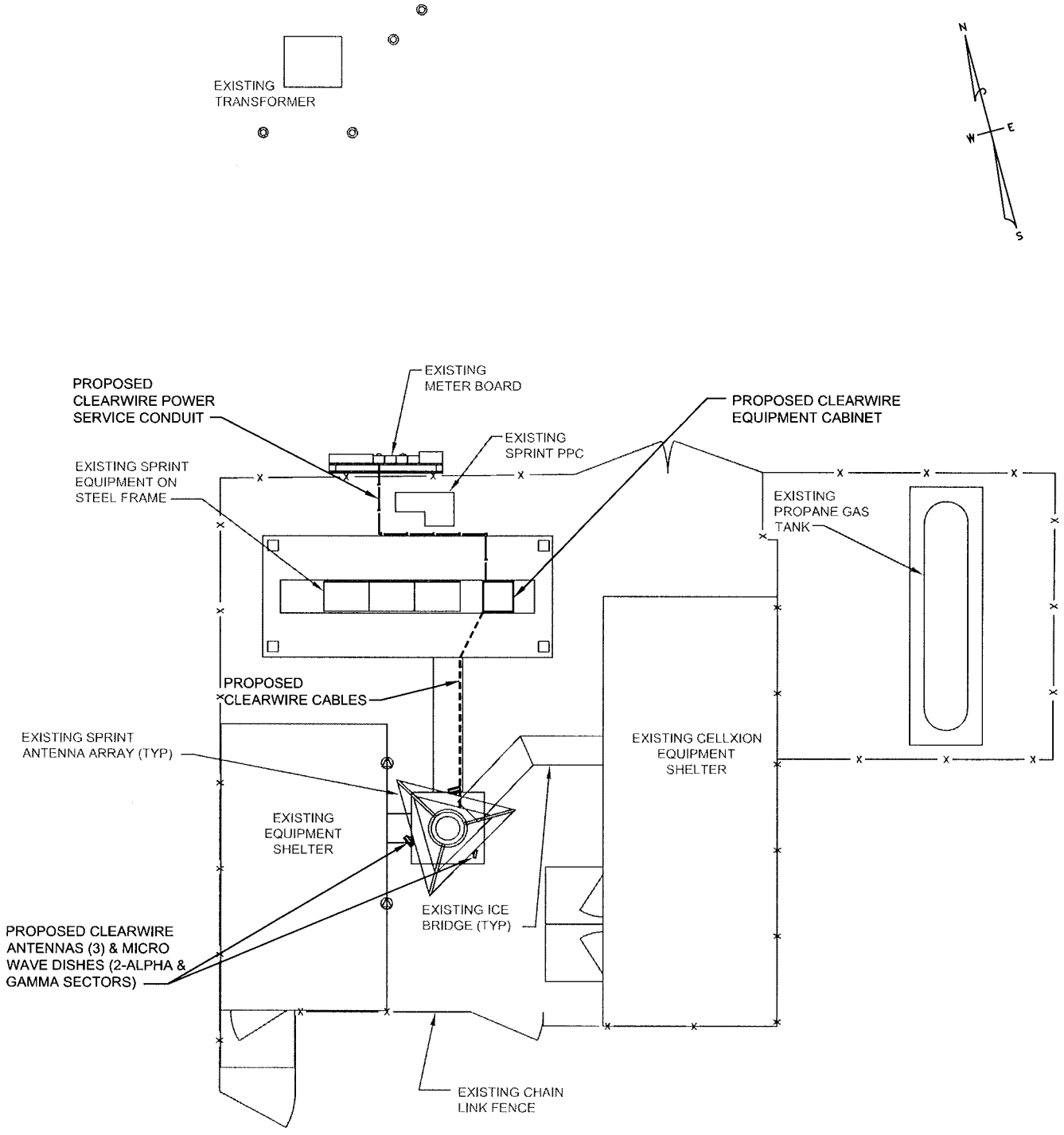
The addition of new WiMAX antennas and microwave dishes will not adversely impact the health and safety of the surrounding community or the people working on the tower. The total radio frequency exposure measured around the base of the tower will be well below the National Council on Radiation Protection and Measurements' (NCRP) standard adopted by the Federal Communications Commission (FCC). The worst case power density analysis for the WiMAX antennas and dishes, measured at the base of the tower, indicates that the WiMAX antennas and dishes will emit .0035% of the NCRP's standard for maximum permissible exposure. The cumulative power density analysis indicates that all the antennas on the structure will emit 11.3091% of the NRCP's standard for maximum permissible exposure. Therefore, the power density levels will be well below the FCC mandated radio frequency exposure limits in all locations around the base of the tower. The power density analysis is attached.

In conclusion, Clearwire's proposed plan to add three (3) WiMAX antennas, three (3) microwave dishes and the associated base station equipment does not constitute a modification subject to the Council's jurisdiction because Clearwire will not increase the height of the tower, will not extend the boundaries of the compound at the site, will not increase the noise levels at the site and the radio frequency electromagnetic radiation power density will stay within all applicable standards.

Respectfully Submitted

Thomas F. Flynn III
Site Development Project Manager
Maxton Technology Inc.
1296 Blue Hills Avenue
Bloomfield, CT 06002
508-821-6974
Tom.Flynn@maxtontech.com
Agent for Clearwire Corporation

Cc: City of Hartford
Mayor Eddie Perez

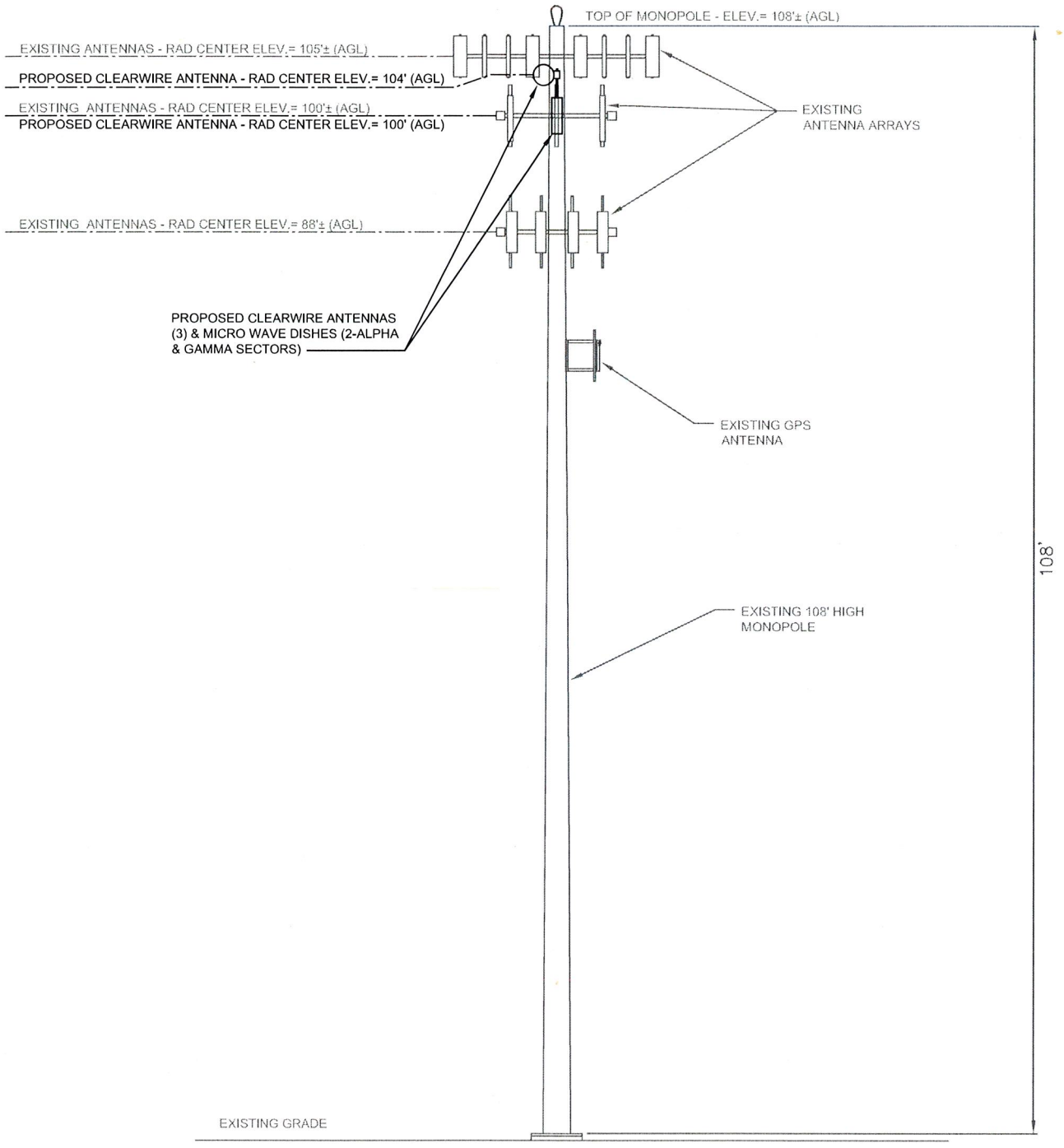


SITE PLAN

SCALE: NTS

ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATION OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITIES COMPANIES.

DiCESARE BENTLEY ENGINEERS / SURVEYORS / PLANNERS	clear w're® CLEAR WIRELESS, LLC 4400 CARILLION POINT KIRKLAND, WA 98033	PROJECT LOCATION: HARTFORD CT-HFD0072A 219 NEW PARK AVENUE HARTFORD, CT	SITE TYPE: MONOPOLE CO-LOCATION		DB PROJ. #: 09-083.28
			PROJECT MANAGER: PB	DRAWN BY: ACG	L1
		APPROVED BY:	DATE: 3/8/2010	REVISION: 2	



TOWER ELEVATION

SCALE: NTS

ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATION OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITIES COMPANIES.

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			PROJECT MANAGER: PB	DRAWN BY: ACG	L2
		APPROVED BY:	DATE: 3/8/2010	REVISION: 2	

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

May 20, 2010

Modified Structure is Adequate
Modified Monopole is Adequate
Foundation is Adequate

Drew Mason
Tower Reinforcement, Inc.
4763 Rosebud Lane
Suite A
Newburgh, IN 47630
812-421-1470

Subject: Structural Analysis Report of Existing 108-Ft Monopole with Proposed Modifications

Contractor Designation	**Tower Reinforcement, Inc.**	**MR-1971**
Carrier Designation	**Clearwire Corp Co-Locate**	
	Carrier Site Number:	**CT23XC550**
	Carrier Site Name:	**N/a**
Crown Castle Designation	**Crown Castle BU Number:**	**876363**
	Crown Castle Site Name:	**HARTFORD - NU (SSUSA)**
	Crown Castle JDE Job Number:	**129217**
	Crown Castle Application Number:	**87974 Rev. 1**
Engineering Firm Designation	**Paul J. Ford and Company**	**67310-0013**
Site Data	**219 New Park Rd., HARTFORD, Hartford County, CT** **Latitude 41° 45' 2.8", Longitude -72° 42' 49.2"**	

Dear Drew Mason,

Paul J. Ford and Company is pleased to submit this "Structural Analysis Report" to determine the structural adequacy of the above monopole. This analysis has been performed in accordance with the TIA/EIA-222-F Standard for the following Basic Wind Speeds: 80 mph without ice, 38 mph with 1.0" radial ice, and 50 mph (Operational) without ice.

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

LC1: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table 1 and Table 2 for the proposed and existing/reserved loading, respectively.

Based on our analysis, we have determined that (a.) the existing monopole structure is overstressed, and (b.) the foundation has sufficient capacity to support the existing, reserved, and proposed loading. When the specified modifications to the monopole structure are completed, the reinforced monopole and existing foundation will have sufficient capacity to support the existing, reserved, and proposed loading.

Respectfully submitted,

Joshua Frybarger, EIT
Structural Engineer
jfrybarger@pjfweb.com

STATE OF CONNECTICUT
JOSEPH PACHICARA JACOBS
No. PEN 22731
LICENSED
PROFESSIONAL ENGINEER
MAY 21 2010

TABLE OF CONTENTS

INTRODUCTION

At the request of Tower Reinforcement, Inc., Paul J. Ford and Company has analyzed the monopole with proposed modifications at the HARTFORD - NU (SSUSA) site located in HARTFORD, Hartford County, CT. This structural analysis has been performed in accordance with the TIA/EIA-222-F-1996 Standard, "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures" to determine if the monopole structure has adequate capacity to support the existing, reserved, and proposed antenna loading.

ANALYSIS CRITERIA

The existing monopole with proposed modifications has been analyzed for the antenna and coax loading listed in Tables 1 and 2 below. The monopole has been analyzed in accordance with the TIA/EIA-222-F-1996 Standard for the following fastest-mile Basic Wind Speeds: 80 mph without ice, 38 with 1.0" radial ice, and 50 mph without ice as recommended for Hartford County, CT.

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
98	103	2	Dragonwave	Horizon Compact	6 (E) 3 (E)	5/16 1/2	Proposed
		2	Dragonwave	A-ANT-18G-2-C			
	99	3	Argus	LLPX310R W/ MOUNT PIPE			
		3	Samsung	Wimax DAP Head			
		1	Motorola	Timing 2000			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level ft	Center Line Elevation ft	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
105	105	6	Antel	LPA-80063/4CFx5 w/Mount Pipe	12 (I)	1 1/4	Existing
		6	Antel	LPA-171080/8CFx2 w/ Mount Pipe			
		6	-	TMA			
		1	-	Sector Mount [SM 308-3]			
98	99	9*	EMS	FV65-14-00NA2 w/Mount Pipe	9 (I)	1 5/8	MLA
	98	1	-	Platform Mount [LP 304-1]	-	-	Existing
88	88	12	Decibel	844G65VTZAS w/Mount Pipe	12 (I)	1 1/4	Existing
		1	-	Platform Mount [LP 303-1]			
76	77	1	Lucent	KS24019-L112A	1 (I)	1/2	Existing
	76	1	-	3' Side Arm Mount			

* MLA loading controls over existing (4) Decibel DB980H65T2E-M, (2) Decibel DB950F65E-M & (6) 1 1/4" coax.

(E) Coax to be mounted externally and exposed to the wind. See coax layout in Appendix B.
(I) Coax to be mounted internally and shielded from the wind. See coax layout in Appendix B.

Information for the existing monopole and foundation is based on the available drawings, documents, and/or information listed in Table 3 below.

Table 3 - Reference Documents Provided

Document	Source	Reference	Remarks
Proposed Antenna Loading	Crown Castle	876363	
Existing Antenna Loading	Crown Castle	876363	
Tower Reinforcement Drawings	CCISITES	2445633	Vertical Solutions, 09008.02, 1/28/09
Geotechnical Reports	CCISITES	1531938	FDH, 08-10012E G1, 10/13/08
Tower Foundation Drawings	CCISITES	1613616	PJF, 29200-1570, 11/8/00
Tower Manufacturer Drawings	CCISITES	1614625	Summit, 11049, 10/23/00
Tower Structural Analysis Reports	CCISITES	2575589	PJF, 37510-0028, 1/11/10
Modification Drawings	PJF		PJF, 67310-0013, 5/20/10

ANALYSIS PROCEDURE

ANALYSIS METHODS

RISA Tower (Version 5.4.1.8), a commercially available software program, was used to create a three-dimensional model of the monopole and calculate member stresses for various dead, live, wind, and ice load cases. The analysis was performed in accordance with the TIA/EIA-222-F Standard. Selected output from the analysis is included in Appendix A.

ASSUMPTIONS

1. Monopole was fabricated and installed in accordance with the manufacturer's specifications.
2. Monopole has been properly maintained in accordance with manufacturer's specifications.
3. The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4. The proposed modifications per PJF job 67310-0013, dated 5/20/10, have been properly installed.

If any of the above assumptions are not valid or have been made in error, then the results of this analysis may be affected. In that case, please notify Paul J. Ford and Company immediately so that we can review any new and/or modified information and determine its affect on the analysis results regarding the structural adequacy of the monopole and foundation.

ANALYSIS RESULTS

Once the specified modifications to the existing monopole structure are completed, our structural analysis indicates that the reinforced monopole and existing foundation will have sufficient capacity to adequately support the existing, reserved, and proposed loading.

Table 4 - Component Stresses vs. Capacity (for Reinforced Condition)

Notes	Component	Elevation ft	% Capacity	Pass / Fail
Risa Tower Analysis Summary:				
	L1	108 - 98.5	70.6	Pass
	L2	98.5 - 98	70.6	Pass
	L3	98 - 79.5	97.5	Pass
	L4	79.5 - 76.75	94.7	Pass
	L5	76.75 - 64.17	98.5	Pass
	L6	64.17 - 59.5	92.2	Pass
	L7	59.5 - 47	88.3	Pass
	L8	47 - 29.75	99.9	Pass
	L9	29.75 - 13	98.1	Pass
	L10	13 - 11.75	82.0	Pass
	L11	11.75 - 0	99.3	Pass
Additional Components:				
	Flange Plate (TOP)	98 - 98	63.8	Pass
	Flange Plate (BOT)	98 - 98	39.8	Pass
	Flange Bolts	98 - 98	30.3	Pass
	Base Plate	0 - 0	86.2	Pass
	Anchor Rods	0 - 0	90.9	Pass
	Foundation (Soil)	0 - 0	58.2	Pass
	Foundation (Structural)	0 - 0	83.0	Pass
			Structural Rating (maximum capacity of all components) =	**99.9**

Our analysis indicates that (a.) the existing monopole structure is overstressed, and (b.) the foundation has sufficient capacity to support the existing, reserved, and proposed loading. When the specified modifications to the monopole structure are completed, the reinforced monopole and existing foundation will have sufficient capacity to support the existing, reserved, and proposed loading, as summarized in Table 4 above.

Table 5 - Microwave Dish Tilt (Sway) Results for 50 mph Service Wind

Dish Elevation ft	Dish	Dish Diameter ft	Dish Frequency GHz	Analysis Results Tilt(Sway) at Service Wind deg
103	A-ANT-18G-2-C	2.18	19.70	3.35

APPENDIX A

Output From Computer Programs

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 1.0000 in.
4. Ice thickness is considered to increase with height.
5. Ice density of 56 pcf.
6. A wind speed of 38 mph is used in combination with ice.
7. Deflections calculated using a wind speed of 50 mph.
8. A non-linear (P-delta) analysis was used.
9. Pressures are calculated at each section.
10. Stress ratio used in pole design is 1.333.
11. 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	108.00-98.50	9.50	0.00	Round	8.6250	8.6250	0.3125		A53-B-35 (35 ksi)
L2	98.50-98.00	0.50	0.00	Round	8.6250	16.5000	0.3125		A53-B-35 (35 ksi)
L3	98.00-79.50	18.50	0.00	18	16.5000	19.4611	0.1875	0.7500	A607-65 (65 ksi)
L4	79.50-76.75	2.75	0.00	18	19.4611	19.9012	0.2137	0.8548	65 ksi (w/ Reinf.) (65 ksi)
L5	76.75-64.17	12.58	0.00	18	19.9012	21.9153	0.2777	1.1108	65 ksi (w/ Reinf.) (65 ksi)
L6	64.17-59.50	4.67	0.00	18	21.9153	22.6623	0.3196	1.2784	65 ksi (w/ Reinf.) (65 ksi)
L7	59.50-47.00	12.50	3.25	18	22.6623	24.6630	0.3726	1.4904	65 ksi (w/ Reinf.) (65 ksi)
L8	47.00-29.75	20.50	0.00	18	23.3976	27.0487	0.3879	1.5516	65 ksi (w/ Reinf.) (65 ksi)
L9	29.75-13.00	16.75	0.00	18	27.0487	29.7294	0.4182	1.6728	65 ksi (w/ Reinf.) (65 ksi)
L10	13.00-11.75	1.25	0.00	18	29.7294	29.9695	0.5047	2.0188	65 ksi (w/ Reinf.) (65 ksi)
L11	11.75-0.00	11.75		18	29.9695	31.8100	0.4236	1.6944	65 ksi (w/ Reinf.) (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	8.6250	8.1608	70.5403	2.9426	4.3125	16.3572	140.8885	4.0780	0.0000	0
	8.6250	8.1608	70.5403	2.9426	4.3125	16.3572	140.8885	4.0780	0.0000	0
L2	8.6250	8.1608	70.5403	2.9426	4.3125	16.3572	140.8885	4.0780	0.0000	0
	16.5000	15.8920	520.9331	5.7304	8.2500	63.1434	1040.4469	7.9413	0.0000	0
L3	16.7545	9.7080	326.3677	5.7909	8.3820	38.9367	653.1649	4.8549	2.5740	13.728
	19.7613	11.4702	538.3121	6.8421	9.8862	54.4507	1077.3326	5.7362	3.0952	16.507
L4	19.7613	13.0552	611.0336	6.8328	9.8862	61.8065	1222.8713	6.5288	3.0490	14.268
	20.2082	13.3537	653.9140	6.9891	10.1098	64.6811	1308.6884	6.6781	3.1265	14.63
L5	20.2082	17.2965	841.4914	6.9663	10.1098	83.2351	1684.0900	8.6499	3.0139	10.853
	22.2534	19.0718	1128.0998	7.6813	11.1330	101.3296	2257.6840	9.5377	3.3683	12.129
L6	22.2534	21.9069	1290.7823	7.6665	11.1330	115.9423	2583.2630	10.9555	3.2946	10.309
	23.0119	22.6647	1429.4142	7.9317	11.5124	124.1625	2860.7094	11.3345	3.4261	10.72
L7	23.0119	26.3605	1654.6262	7.9128	11.5124	143.7250	3311.4296	13.1828	3.3328	8.945
	25.0435	28.7266	2141.3676	8.6231	12.5288	170.9156	4285.5528	14.3660	3.6849	9.89
L8	24.3463	28.3294	1894.9512	8.1684	11.8860	159.4273	3792.3959	14.1674	3.4353	8.856
	27.4660	32.8246	2947.7027	9.4646	13.7407	214.5229	5899.2841	16.4154	4.0779	10.513
L9	27.4660	35.3484	3167.1334	9.4538	13.7407	230.4922	6338.4343	17.6776	4.0245	9.623
	30.1880	38.9067	4223.0789	10.4055	15.1025	279.6272	8451.7147	19.4571	4.4963	10.752
L10	30.1880	46.8156	5051.5873	10.3748	15.1025	334.4860	10109.8216	23.4122	4.3441	8.607
	30.4318	47.2002	5177.1193	10.4600	15.2245	340.0517	10361.0507	23.6046	4.3864	8.691
L11	30.4318	39.7247	4381.1891	10.4888	15.2245	287.7722	8768.1430	19.8661	4.5291	10.692
	32.3007	42.1992	5252.0015	11.1422	16.1595	325.0105	10510.9137	21.1036	4.8530	11.457

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
LDF6-50A (1-1/4 FOAM)	B	No	Inside Pole	105.00 - 0.00	12	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
*** SPRINT *** (1 5/8" foam)	A	No	Inside Pole	98.00 - 0.00	9	No Ice	0.00	0.92
						1/2" Ice	0.00	0.92
						1" Ice	0.00	0.92
						2" Ice	0.00	0.92
						4" Ice	0.00	0.92
*** CLEARWIRE *** 1/2 FOAM	C	No	CaAa (Out Of Face)	78.00 - 0.00	3	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
LDF4-50A (1/2 FOAM)	C	No	CaAa (Out Of Face)	98.00 - 78.00	1	No Ice	0.06	0.15
						1/2" Ice	0.16	0.84
						1" Ice	0.26	2.14
						2" Ice	0.46	6.58
						4" Ice	0.86	22.78
1/2 FOAM	C	No	CaAa (Out Of Face)	98.00 - 78.00	2	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
5/16"	C	No	CaAa (Out Of Face)	78.00 - 0.00	6	No Ice	0.00	0.60
						1/2" Ice	0.00	1.11
						1" Ice	0.00	2.22
						2" Ice	0.00	6.29
						4" Ice	0.00	21.76
9207 (5/16")	C	No	CaAa (Out Of Face)	98.00 - 78.00	1	No Ice	0.03	0.60
						1/2" Ice	0.13	1.11

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1" Ice	0.23	2.22
						2" Ice	0.43	6.29
						4" Ice	0.83	21.76
5/16"	C	No	CaAa (Out Of Face)	98.00 - 78.00	5	No Ice	0.00	0.60
						1/2" Ice	0.00	1.11
						1" Ice	0.00	2.22
						2" Ice	0.00	6.29
						4" Ice	0.00	21.76
***								
(1 1/4" foam)	C	No	Inside Pole	88.00 - 0.00	12	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
***								
(1/2" foam)	A	No	Inside Pole	76.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
***								
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	78.00 - 0.00	1	No Ice	0.21	0.00
						1/2" Ice	0.32	0.00
						1" Ice	0.43	0.00
						2" Ice	0.65	0.00
						4" Ice	1.10	0.00
1" Flat Reinforcement	A	No	CaAa (Out Of Face)	59.50 - 0.00	1	No Ice	0.17	0.11
						1/2" Ice	0.28	11.08
						1" Ice	0.39	12.51
						2" Ice	0.61	16.40
						4" Ice	1.06	28.32
3/4" Flat Reinforcement	A	No	CaAa (Out Of Face)	65.00 - 59.50	1	No Ice	0.13	6.00
						1/2" Ice	0.24	6.56
						1" Ice	0.35	7.47
						2" Ice	0.57	10.32
						4" Ice	1.01	20.17
3/4" Flat Reinforcement	A	No	CaAa (Out Of Face)	80.50 - 75.50	1	No Ice	0.13	6.00
						1/2" Ice	0.24	6.56
						1" Ice	0.35	7.47
						2" Ice	0.57	10.32
						4" Ice	1.01	20.17

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	108.00-98.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.05
		C	0.000	0.000	0.000	0.000	0.00
L2	98.50-98.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L3	98.00-79.50	A	0.000	0.000	0.000	0.125	0.16
		B	0.000	0.000	0.000	0.000	0.15
		C	0.000	0.000	0.000	1.776	0.14
L4	79.50-76.75	A	0.000	0.000	0.000	0.344	0.04
		B	0.000	0.000	0.000	0.000	0.02
		C	0.000	0.000	0.000	0.404	0.03
L5	76.75-64.17	A	0.000	0.000	0.000	0.260	0.12
		B	0.000	0.000	0.000	0.000	0.10
		C	0.000	0.000	0.000	2.621	0.15
L6	64.17-59.50	A	0.000	0.000	0.000	0.584	0.07
		B	0.000	0.000	0.000	0.000	0.04

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	0.000	0.973	0.06
L7	59.50-47.00	A	0.000	0.000	0.000	2.083	0.11
		B	0.000	0.000	0.000	0.000	0.10
		C	0.000	0.000	0.000	2.604	0.15
L8	47.00-29.75	A	0.000	0.000	0.000	2.875	0.15
		B	0.000	0.000	0.000	0.000	0.14
		C	0.000	0.000	0.000	3.594	0.21
L9	29.75-13.00	A	0.000	0.000	0.000	2.792	0.14
		B	0.000	0.000	0.000	0.000	0.13
		C	0.000	0.000	0.000	3.490	0.20
L10	13.00-11.75	A	0.000	0.000	0.000	0.208	0.01
		B	0.000	0.000	0.000	0.000	0.01
		C	0.000	0.000	0.000	0.260	0.01
L11	11.75-0.00	A	0.000	0.000	0.000	1.958	0.10
		B	0.000	0.000	0.000	0.000	0.09
		C	0.000	0.000	0.000	2.448	0.14

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	108.00-98.50	A	1.147	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.05
		C		0.000	0.000	0.000	0.000	0.00
L2	98.50-98.00	A	1.140	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L3	98.00-79.50	A	1.126	0.000	0.000	0.000	0.375	0.16
		B		0.000	0.000	0.000	0.000	0.15
		C		0.000	0.000	0.000	10.106	0.52
L4	79.50-76.75	A	1.109	0.000	0.000	0.000	1.021	0.04
		B		0.000	0.000	0.000	0.000	0.02
		C		0.000	0.000	0.000	1.378	0.09
L5	76.75-64.17	A	1.095	0.000	0.000	0.000	0.766	0.12
		B		0.000	0.000	0.000	0.000	0.10
		C		0.000	0.000	0.000	5.682	0.39
L6	64.17-59.50	A	1.078	0.000	0.000	0.000	1.703	0.08
		B		0.000	0.000	0.000	0.000	0.04
		C		0.000	0.000	0.000	2.092	0.14
L7	59.50-47.00	A	1.059	0.000	0.000	0.000	5.025	0.26
		B		0.000	0.000	0.000	0.000	0.10
		C		0.000	0.000	0.000	5.546	0.37
L8	47.00-29.75	A	1.018	0.000	0.000	0.000	6.934	0.37
		B		0.000	0.000	0.000	0.000	0.14
		C		0.000	0.000	0.000	7.653	0.52
L9	29.75-13.00	A	1.000	0.000	0.000	0.000	6.514	0.35
		B		0.000	0.000	0.000	0.000	0.13
		C		0.000	0.000	0.000	7.212	0.46
L10	13.00-11.75	A	1.000	0.000	0.000	0.000	0.486	0.03
		B		0.000	0.000	0.000	0.000	0.01
		C		0.000	0.000	0.000	0.538	0.03
L11	11.75-0.00	A	1.000	0.000	0.000	0.000	4.569	0.25
		B		0.000	0.000	0.000	0.000	0.09
		C		0.000	0.000	0.000	5.059	0.33

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	108.00-98.50	0.0000	0.0000	0.0000	0.0000

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L2	98.50-98.00	0.0000	0.0000	0.0000	0.0000
L3	98.00-79.50	-0.1167	0.0572	-0.4720	0.2507
L4	79.50-76.75	-0.1642	-0.0660	-0.3956	-0.1104
L5	76.75-64.17	-0.2392	0.1109	-0.4194	0.1774
L6	64.17-59.50	-0.2295	-0.0265	-0.3793	-0.1375
L7	59.50-47.00	-0.2274	-0.0788	-0.3796	-0.1780
L8	47.00-29.75	-0.2301	-0.0797	-0.3892	-0.1825
L9	29.75-13.00	-0.2336	-0.0809	-0.3948	-0.1838
L10	13.00-11.75	-0.2352	-0.0815	-0.4005	-0.1865
L11	11.75-0.00	-0.2362	-0.0818	-0.4044	-0.1883

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) LPA-80063/4CFx5 w/Mount Pipe	A	From Face	4.00	0.00	0.0000	105.00	No Ice	7.73	7.75	0.05
			0.00				1/2" Ice	8.46	8.87	0.11
							1" Ice	9.07	9.71	0.19
							2" Ice	10.32	11.43	0.38
							4" Ice	12.96	15.08	0.87
(2) LPA-80063/4CFx5 w/Mount Pipe	B	From Face	4.00	0.00	0.0000	105.00	No Ice	7.73	7.75	0.05
			0.00				1/2" Ice	8.46	8.87	0.11
							1" Ice	9.07	9.71	0.19
							2" Ice	10.32	11.43	0.38
							4" Ice	12.96	15.08	0.87
(2) LPA-80063/4CFx5 w/Mount Pipe	C	From Face	4.00	0.00	0.0000	105.00	No Ice	7.73	7.75	0.05
			0.00				1/2" Ice	8.46	8.87	0.11
							1" Ice	9.07	9.71	0.19
							2" Ice	10.32	11.43	0.38
							4" Ice	12.96	15.08	0.87
(2) Antel LPA-171080/8CFx2 w/ Mount Pipe	A	From Face	4.00	0.00	0.0000	105.00	No Ice	2.27	4.34	0.04
			0.00				1/2" Ice	2.57	4.95	0.07
							1" Ice	2.88	5.57	0.12
							2" Ice	3.52	6.88	0.22
							4" Ice	5.09	9.91	0.51
(2) Antel LPA-171080/8CFx2 w/ Mount Pipe	B	From Face	4.00	0.00	0.0000	105.00	No Ice	2.27	4.34	0.04
			0.00				1/2" Ice	2.57	4.95	0.07
							1" Ice	2.88	5.57	0.12
							2" Ice	3.52	6.88	0.22
							4" Ice	5.09	9.91	0.51
(2) Antel LPA-171080/8CFx2 w/ Mount Pipe	C	From Face	4.00	0.00	0.0000	105.00	No Ice	2.27	4.34	0.04
			0.00				1/2" Ice	2.57	4.95	0.07
							1" Ice	2.88	5.57	0.12
							2" Ice	3.52	6.88	0.22
							4" Ice	5.09	9.91	0.51
(2) TMA	A	From Face	4.00	0.00	0.0000	105.00	No Ice	1.50	1.50	0.05
			0.00				1/2" Ice	2.00	2.00	0.07
							1" Ice	3.00	3.00	0.07
							2" Ice	4.00	4.00	0.08
							4" Ice	5.00	5.00	0.09
(2) TMA	B	From Face	4.00	0.00	0.0000	105.00	No Ice	1.50	1.50	0.05
							1/2"	2.00	2.00	0.07

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
			0.00			Ice	3.00	3.00	0.07
						1" Ice	4.00	4.00	0.08
						2" Ice	5.00	5.00	0.09
						4" Ice			
(2) TMA	C	From Face	4.00	0.0000	105.00	No Ice	1.50	1.50	0.05
			0.00			1/2"	2.00	2.00	0.07
			0.00			Ice	3.00	3.00	0.07
						1" Ice	4.00	4.00	0.08
						2" Ice	5.00	5.00	0.09
						4" Ice			
Sector Mount [SM 308-3]	C	None		0.0000	105.00	No Ice	22.34	22.34	0.38
						1/2"	31.70	31.70	0.83
						Ice	41.06	41.06	1.28
						1" Ice	59.78	59.78	2.19
						2" Ice	97.22	97.22	3.99
						4" Ice			
*** SPRINT ***									
(3) FV65-14-00NA2 w/Mount Pipe	A	From Face	4.00	0.0000	99.00	No Ice	8.64	6.95	0.06
			0.00			1/2"	9.29	8.13	0.12
			0.00			Ice	9.91	9.02	0.20
						1" Ice	11.18	10.84	0.38
						2" Ice	13.83	14.85	0.89
						4" Ice			
(3) FV65-14-00NA2 w/Mount Pipe	B	From Face	4.00	0.0000	99.00	No Ice	8.64	6.95	0.06
			0.00			1/2"	9.29	8.13	0.12
			0.00			Ice	9.91	9.02	0.20
						1" Ice	11.18	10.84	0.38
						2" Ice	13.83	14.85	0.89
						4" Ice			
(3) FV65-14-00NA2 w/Mount Pipe	C	From Face	4.00	0.0000	99.00	No Ice	8.64	6.95	0.06
			0.00			1/2"	9.29	8.13	0.12
			0.00			Ice	9.91	9.02	0.20
						1" Ice	11.18	10.84	0.38
						2" Ice	13.83	14.85	0.89
						4" Ice			
*** CLEARWIRE ***									
LLPX310R W/ MOUNT PIPE	A	From Face	4.00	0.0000	99.00	No Ice	4.94	2.82	0.04
			0.00			1/2"	5.33	3.34	0.08
			0.00			Ice	5.72	3.87	0.12
						1" Ice	6.54	5.04	0.22
						2" Ice	8.31	7.78	0.53
						4" Ice			
LLPX310R W/ MOUNT PIPE	B	From Face	4.00	0.0000	99.00	No Ice	4.94	2.82	0.04
			0.00			1/2"	5.33	3.34	0.08
			0.00			Ice	5.72	3.87	0.12
						1" Ice	6.54	5.04	0.22
						2" Ice	8.31	7.78	0.53
						4" Ice			
LLPX310R W/ MOUNT PIPE	C	From Face	4.00	0.0000	99.00	No Ice	4.94	2.82	0.04
			0.00			1/2"	5.33	3.34	0.08
			0.00			Ice	5.72	3.87	0.12
						1" Ice	6.54	5.04	0.22
						2" Ice	8.31	7.78	0.53
						4" Ice			
Wimax DAP Head	A	From Face	4.00	0.0000	99.00	No Ice	1.80	0.78	0.03
			0.00			1/2"	1.99	0.92	0.04
			0.00			Ice	2.18	1.07	0.06
						1" Ice	2.59	1.39	0.09
						2" Ice	3.51	2.14	0.20
						4" Ice			
Wimax DAP Head	B	From Face	4.00	0.0000	99.00	No Ice	1.80	0.78	0.03
			0.00			1/2"	1.99	0.92	0.04

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral ft* / *Vert ft* / *ft*	*Azimuth Adjustment °*	*Placement ft*		*C_AA_A Front ft^2*	*C_AA_A Side ft^2*	*Weight K*
			0.00			Ice	2.18	1.07	0.06
						1" Ice	2.59	1.39	0.09
						2" Ice	3.51	2.14	0.20
						4" Ice			
Wimax DAP Head	C	From Face	4.00	0.0000	99.00	No Ice	1.80	0.78	0.03
			0.00			1/2"	1.99	0.92	0.04
			0.00			Ice	2.18	1.07	0.06
						1" Ice	2.59	1.39	0.09
						2" Ice	3.51	2.14	0.20
						4" Ice			
Horizon Compact	A	From Face	4.00	0.0000	103.00	No Ice	0.84	0.43	0.01
			0.00			1/2"	0.97	0.52	0.02
			0.00			Ice	1.10	0.63	0.03
						1" Ice	1.39	0.86	0.05
						2" Ice	2.08	1.43	0.12
						4" Ice			
Horizon Compact	B	From Face	4.00	0.0000	103.00	No Ice	0.84	0.43	0.01
			0.00			1/2"	0.97	0.52	0.02
			0.00			Ice	1.10	0.63	0.03
						1" Ice	1.39	0.86	0.05
						2" Ice	2.08	1.43	0.12
						4" Ice			
Motorola Timing 2000	C	From Face	4.00	0.0000	99.00	No Ice	0.07	0.07	0.00
			0.00			1/2"	0.12	0.12	0.00
			0.00			Ice	0.17	0.17	0.00
						1" Ice	0.32	0.32	0.01
						2" Ice	0.75	0.75	0.04
						4" Ice			
Platform Mount [LP 304-1]	C	None		0.0000	98.00	No Ice	17.46	17.46	1.35
						1/2"	22.44	22.44	1.62
						Ice	27.42	27.42	1.90
						1" Ice	37.38	37.38	2.45
						2" Ice	57.30	57.30	3.55
						4" Ice			
***									
(4) 844G65VTZAS w/Mount Pipe	A	From Face	4.00	0.0000	88.00	No Ice	6.55	5.63	0.04
			0.00			1/2"	7.25	6.73	0.10
			0.00			Ice	7.85	7.54	0.16
						1" Ice	9.06	9.21	0.31
						2" Ice	11.64	12.75	0.74
						4" Ice			
(4) 844G65VTZAS w/Mount Pipe	B	From Face	4.00	0.0000	88.00	No Ice	6.55	5.63	0.04
			0.00			1/2"	7.25	6.73	0.10
			0.00			Ice	7.85	7.54	0.16
						1" Ice	9.06	9.21	0.31
						2" Ice	11.64	12.75	0.74
						4" Ice			
(4) 844G65VTZAS w/Mount Pipe	C	From Face	4.00	0.0000	88.00	No Ice	6.55	5.63	0.04
			0.00			1/2"	7.25	6.73	0.10
			0.00			Ice	7.85	7.54	0.16
						1" Ice	9.06	9.21	0.31
						2" Ice	11.64	12.75	0.74
						4" Ice			
Platform Mount [LP 303-1]	C	None		0.0000	88.00	No Ice	14.66	14.66	1.25
						1/2"	18.87	18.87	1.48
						Ice	23.08	23.08	1.71
						1" Ice	31.50	31.50	2.18
						2" Ice	48.34	48.34	3.10
						4" Ice			
***									
KS24019-L112A	A	From Face	2.00	0.0000	77.00	No Ice	0.10	0.10	0.01
			0.00			1/2"	0.18	0.18	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	0.26	0.26	0.01
						1" Ice	0.42	0.42	0.01
						2" Ice	0.74	0.74	0.02
						4" Ice			
3' Side Arm Mount	A	None		0.0000	76.00	No Ice	0.76	0.76	0.03
						1/2" Ice	0.96	0.96	0.04
						1" Ice	1.16	1.16	0.05
						2" Ice	1.67	1.67	0.08
						4" Ice	2.81	2.81	0.17

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
A-ANT-18G-2-C	A	Paraboloid w/Radome	From Face	4.00 / 0.00 / 0.00	0.0000		103.00	2.17	No Ice	3.72	0.03
									1/2" Ice	4.01	0.04
									1" Ice	4.30	0.05
									2" Ice	4.88	0.07
									4" Ice	6.04	0.11
A-ANT-18G-2-C	B	Paraboloid w/Radome	From Face	4.00 / 0.00 / 0.00	0.0000		103.00	2.17	No Ice	3.72	0.03
									1/2" Ice	4.01	0.04
									1" Ice	4.30	0.05
									2" Ice	4.88	0.07
									4" Ice	6.04	0.11

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 108.00-98.50	103.25	1.385	23	6.828	A	0.000	6.828	6.828	100.00	0.000	0.000
					B	0.000	6.828		100.00	0.000	0.000
					C	0.000	6.828		100.00	0.000	0.000
L2 98.50-98.00	98.22	1.366	22	0.523	A	0.000	0.523	0.523	100.00	0.000	0.000
					B	0.000	0.523		100.00	0.000	0.000
					C	0.000	0.523		100.00	0.000	0.000
L3 98.00-79.50	88.50	1.326	22	27.720	A	0.000	27.720	27.720	100.00	0.000	0.125
					B	0.000	27.720		100.00	0.000	0.000
					C	0.000	27.720		100.00	0.000	1.776
L4 79.50-76.75	78.12	1.279	21	4.510	A	0.000	4.510	4.510	100.00	0.000	0.344
					B	0.000	4.510		100.00	0.000	0.000
					C	0.000	4.510		100.00	0.000	0.404
L5 76.75-64.17	70.36	1.241	20	21.919	A	0.000	21.919	21.919	100.00	0.000	0.260
					B	0.000	21.919		100.00	0.000	0.000
					C	0.000	21.919		100.00	0.000	2.621
L6 64.17-59.50	61.82	1.196	20	8.674	A	0.000	8.674	8.674	100.00	0.000	0.584
					B	0.000	8.674		100.00	0.000	0.000
					C	0.000	8.674		100.00	0.000	0.973
L7 59.50-47.00	53.16	1.146	19	24.649	A	0.000	24.649	24.649	100.00	0.000	2.083
					B	0.000	24.649		100.00	0.000	0.000
					C	0.000	24.649		100.00	0.000	2.604
L8 47.00-29.75	38.20	1.043	17	36.674	A	0.000	36.674	36.674	100.00	0.000	2.875
					B	0.000	36.674		100.00	0.000	0.000

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	36.674		100.00	0.000	3.594
L9 29.75-13.00	21.24	1	16	39.626	A	0.000	39.626	39.626	100.00	0.000	2.792
					B	0.000	39.626		100.00	0.000	0.000
					C	0.000	39.626		100.00	0.000	3.490
L10 13.00-11.75	12.37	1	16	3.109	A	0.000	3.109	3.109	100.00	0.000	0.208
					B	0.000	3.109		100.00	0.000	0.000
					C	0.000	3.109		100.00	0.000	0.260
L11 11.75-0.00	5.82	1	16	30.246	A	0.000	30.246	30.246	100.00	0.000	1.958
					B	0.000	30.246		100.00	0.000	0.000
					C	0.000	30.246		100.00	0.000	2.448

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 108.00-98.50	103.25	1.385	5	1.1467	8.644	A	0.000	8.644	8.644	100.00	0.000	0.000
						B	0.000	8.644		100.00	0.000	0.000
						C	0.000	8.644		100.00	0.000	0.000
L2 98.50-98.00	98.22	1.366	5	1.1398	0.618	A	0.000	0.618	0.618	100.00	0.000	0.000
						B	0.000	0.618		100.00	0.000	0.000
						C	0.000	0.618		100.00	0.000	0.000
L3 98.00-79.50	88.50	1.326	5	1.1257	31.191	A	0.000	31.191	31.191	100.00	0.000	0.375
						B	0.000	31.191		100.00	0.000	0.000
						C	0.000	31.191		100.00	0.000	10.106
L4 79.50-76.75	78.12	1.279	5	1.1089	5.019	A	0.000	5.019	5.019	100.00	0.000	1.021
						B	0.000	5.019		100.00	0.000	0.000
						C	0.000	5.019		100.00	0.000	1.378
L5 76.75-64.17	70.36	1.241	4	1.0951	24.215	A	0.000	24.215	24.215	100.00	0.000	0.766
						B	0.000	24.215		100.00	0.000	0.000
						C	0.000	24.215		100.00	0.000	5.682
L6 64.17-59.50	61.82	1.196	4	1.0782	9.513	A	0.000	9.513	9.513	100.00	0.000	1.703
						B	0.000	9.513		100.00	0.000	0.000
						C	0.000	9.513		100.00	0.000	2.092
L7 59.50-47.00	53.16	1.146	4	1.0589	26.855	A	0.000	26.855	26.855	100.00	0.000	5.025
						B	0.000	26.855		100.00	0.000	0.000
						C	0.000	26.855		100.00	0.000	5.546
L8 47.00-29.75	38.20	1.043	4	1.0177	39.719	A	0.000	39.719	39.719	100.00	0.000	6.934
						B	0.000	39.719		100.00	0.000	0.000
						C	0.000	39.719		100.00	0.000	7.653
L9 29.75-13.00	21.24	1	4	1.0000	42.418	A	0.000	42.418	42.418	100.00	0.000	6.514
						B	0.000	42.418		100.00	0.000	0.000
						C	0.000	42.418		100.00	0.000	7.212
L10 13.00-11.75	12.37	1	4	1.0000	3.318	A	0.000	3.318	3.318	100.00	0.000	0.486
						B	0.000	3.318		100.00	0.000	0.000
						C	0.000	3.318		100.00	0.000	0.538
L11 11.75-0.00	5.82	1	4	1.0000	32.205	A	0.000	32.205	32.205	100.00	0.000	4.569
						B	0.000	32.205		100.00	0.000	0.000
						C	0.000	32.205		100.00	0.000	5.059

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 108.00-98.50	103.25	1.385	9	6.828	A	0.000	6.828	6.828	100.00	0.000	0.000
					B	0.000	6.828		100.00	0.000	0.000
					C	0.000	6.828		100.00	0.000	0.000
L2 98.50-	98.22	1.366	9	0.523	A	0.000	0.523	0.523	100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
98.00					B	0.000	0.523		100.00	0.000	0.000
					C	0.000	0.523		100.00	0.000	0.000
L3 98.00-79.50	88.50	1.326	8	27.720	A	0.000	27.720	27.720	100.00	0.000	0.125
					B	0.000	27.720		100.00	0.000	0.000
					C	0.000	27.720		100.00	0.000	1.776
L4 79.50-76.75	78.12	1.279	8	4.510	A	0.000	4.510	4.510	100.00	0.000	0.344
					B	0.000	4.510		100.00	0.000	0.000
					C	0.000	4.510		100.00	0.000	0.404
L5 76.75-64.17	70.36	1.241	8	21.919	A	0.000	21.919	21.919	100.00	0.000	0.260
					B	0.000	21.919		100.00	0.000	0.000
					C	0.000	21.919		100.00	0.000	2.621
L6 64.17-59.50	61.82	1.196	8	8.674	A	0.000	8.674	8.674	100.00	0.000	0.584
					B	0.000	8.674		100.00	0.000	0.000
					C	0.000	8.674		100.00	0.000	0.973
L7 59.50-47.00	53.16	1.146	7	24.649	A	0.000	24.649	24.649	100.00	0.000	2.083
					B	0.000	24.649		100.00	0.000	0.000
					C	0.000	24.649		100.00	0.000	2.604
L8 47.00-29.75	38.20	1.043	7	36.674	A	0.000	36.674	36.674	100.00	0.000	2.875
					B	0.000	36.674		100.00	0.000	0.000
					C	0.000	36.674		100.00	0.000	3.594
L9 29.75-13.00	21.24	1	6	39.626	A	0.000	39.626	39.626	100.00	0.000	2.792
					B	0.000	39.626		100.00	0.000	0.000
					C	0.000	39.626		100.00	0.000	3.490
L10 13.00-11.75	12.37	1	6	3.109	A	0.000	3.109	3.109	100.00	0.000	0.208
					B	0.000	3.109		100.00	0.000	0.000
					C	0.000	3.109		100.00	0.000	0.260
L11 11.75-0.00	5.82	1	6	30.246	A	0.000	30.246	30.246	100.00	0.000	1.958
					B	0.000	30.246		100.00	0.000	0.000
					C	0.000	30.246		100.00	0.000	2.448

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
15	Dead+Wind 0 deg+Ice
16	Dead+Wind 30 deg+Ice
17	Dead+Wind 60 deg+Ice
18	Dead+Wind 90 deg+Ice
19	Dead+Wind 120 deg+Ice
20	Dead+Wind 150 deg+Ice
21	Dead+Wind 180 deg+Ice
22	Dead+Wind 210 deg+Ice
23	Dead+Wind 240 deg+Ice
24	Dead+Wind 270 deg+Ice
25	Dead+Wind 300 deg+Ice
26	Dead+Wind 330 deg+Ice
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service

Comb. No.	Description
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	108 - 98.5	Pole	Max Tension	2	0.00	-0.00	-0.00
			Max. Compression	14	-7.19	0.01	0.34
			Max. Mx	11	-1.26	29.20	0.11
			Max. My	2	-1.29	0.00	28.85
			Max. Vy	11	-7.69	29.20	0.11
			Max. Vx	8	7.65	0.00	-28.85
			Max. Torque	5			0.47
L2	98.5 - 98	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-7.22	0.01	0.34
			Max. Mx	11	-1.29	33.05	0.11
			Max. My	8	-1.30	0.00	-32.68
			Max. Vy	11	-7.71	33.05	0.11
			Max. Vx	8	7.67	0.00	-32.68
			Max. Torque	5			0.46
L3	98 - 79.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.10	0.35	0.19
			Max. Mx	11	-5.08	227.70	0.11
			Max. My	8	-5.09	0.05	-226.54
			Max. Vy	11	-12.75	227.70	0.11
			Max. Vx	8	12.71	0.05	-226.54
			Max. Torque	5			0.46
L4	79.5 - 76.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.47	0.42	0.19
			Max. Mx	11	-5.35	262.95	0.13
			Max. My	8	-5.36	0.07	-261.64
			Max. Vy	11	-12.89	262.95	0.13
			Max. Vx	8	12.84	0.07	-261.64
			Max. Torque	5			0.46
L5	76.75 - 64.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-17.29	0.68	0.08
			Max. Mx	11	-6.75	428.96	0.12
			Max. My	8	-6.76	0.11	-427.09
			Max. Vy	11	-13.49	428.96	0.12
			Max. Vx	8	13.44	0.11	-427.09
			Max. Torque	5			0.46
L6	64.17 - 59.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-18.04	0.77	0.06
			Max. Mx	11	-7.35	492.45	0.14
			Max. My	8	-7.36	0.13	-490.36
			Max. Vy	11	-13.71	492.45	0.14
			Max. Vx	8	13.67	0.13	-490.36
			Max. Torque	5			0.45
L7	59.5 - 47	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.74	0.97	0.08
			Max. Mx	11	-8.63	621.38	0.13
			Max. My	8	-8.63	0.16	-618.89
			Max. Vy	11	-14.17	621.38	0.13
			Max. Vx	8	14.13	0.16	-618.89
			Max. Torque	5			0.45

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L8	47 - 29.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.19	1.39	0.12
			Max. Mx	11	-12.03	921.69	0.08
			Max. My	8	-12.04	0.24	-918.31
			Max. Vy	11	-15.08	921.69	0.08
			Max. Vx	8	15.04	0.24	-918.31
			Max. Torque	5			0.46
L9	29.75 - 13	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27.86	1.72	0.17
			Max. Mx	11	-14.96	1179.59	0.04
			Max. My	8	-14.97	0.31	-1175.48
			Max. Vy	11	-15.72	1179.59	0.04
			Max. Vx	8	15.68	0.31	-1175.48
			Max. Torque	5			0.46
L10	13 - 11.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-28.18	1.75	0.18
			Max. Mx	11	-15.22	1199.26	0.04
			Max. My	8	-15.22	0.32	-1195.11
			Max. Vy	11	-15.77	1199.26	0.04
			Max. Vx	8	15.73	0.32	-1195.11
			Max. Torque	5			0.46
L11	11.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30.94	2.01	0.22
			Max. Mx	11	-17.44	1387.03	-0.00
			Max. My	8	-17.44	0.37	-1382.38
			Max. Vy	11	-16.20	1387.03	-0.00
			Max. Vx	8	16.16	0.37	-1382.38
			Max. Torque	5			0.47

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	30.94	4.97	-0.00
	Max. H_x	11	17.45	16.19	-0.01
	Max. H_z	2	17.45	0.00	16.07
	Max. M_x	2	1374.60	0.00	16.07
	Max. M_z	5	1386.29	-16.19	-0.01
	Max. Torsion	5	0.47	-16.19	-0.01
	Min. Vert	1	17.45	0.00	0.00
	Min. H_x	5	17.45	-16.19	-0.01
	Min. H_z	8	17.45	0.00	-16.15
	Min. M_x	8	-1382.38	0.00	-16.15
	Min. M_z	11	-1387.03	16.19	-0.01
	Min. Torsion	11	-0.47	16.19	-0.01

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	17.45	0.00	0.00	-0.04	0.36	-0.00
Dead+Wind 0 deg - No Ice	17.45	-0.00	-16.07	-1374.60	0.37	-0.09
Dead+Wind 30 deg - No Ice	17.45	8.08	-13.94	-1192.24	-691.55	-0.23
Dead+Wind 60 deg - No Ice	17.45	14.01	-8.06	-690.15	-1199.82	-0.41
Dead+Wind 90 deg - No Ice	17.45	16.19	0.01	0.00	-1386.29	-0.47
Dead+Wind 120 deg - No Ice	17.45	13.99	8.08	691.30	-1197.57	-0.27
Dead+Wind 150 deg - No Ice	17.45	8.07	13.99	1197.83	-690.17	-0.03
Dead+Wind 180 deg - No Ice	17.45	-0.00	16.15	1382.38	0.37	0.09

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 210 deg - No Ice	17.45	-8.07	13.99	1197.82	690.91	0.19
Dead+Wind 240 deg - No Ice	17.45	-13.99	8.08	691.30	1198.31	0.37
Dead+Wind 270 deg - No Ice	17.45	-16.19	0.01	0.00	1387.03	0.47
Dead+Wind 300 deg - No Ice	17.45	-14.01	-8.06	-690.14	1200.56	0.32
Dead+Wind 330 deg - No Ice	17.45	-8.08	-13.94	-1192.24	692.29	0.07
Dead+Ice	30.94	-0.00	-0.00	-0.22	2.01	-0.00
Dead+Wind 0 deg+Ice	30.94	-0.00	-4.94	-452.76	2.06	-0.05
Dead+Wind 30 deg+Ice	30.94	2.48	-4.28	-392.64	-225.49	-0.09
Dead+Wind 60 deg+Ice	30.94	4.30	-2.48	-227.28	-392.58	-0.13
Dead+Wind 90 deg+Ice	30.94	4.97	0.00	-0.21	-453.85	-0.13
Dead+Wind 120 deg+Ice	30.94	4.30	2.48	227.19	-391.95	-0.06
Dead+Wind 150 deg+Ice	30.94	2.48	4.30	393.78	-225.12	0.01
Dead+Wind 180 deg+Ice	30.94	-0.00	4.96	454.51	2.06	0.05
Dead+Wind 210 deg+Ice	30.94	-2.48	4.30	393.78	229.25	0.08
Dead+Wind 240 deg+Ice	30.94	-4.30	2.48	227.19	396.08	0.12
Dead+Wind 270 deg+Ice	30.94	-4.97	0.00	-0.21	457.97	0.13
Dead+Wind 300 deg+Ice	30.94	-4.30	-2.48	-227.28	396.70	0.08
Dead+Wind 330 deg+Ice	30.94	-2.48	-4.28	-392.64	229.62	-0.01
Dead+Wind 0 deg - Service	17.45	0.00	-6.32	-543.02	0.37	-0.04
Dead+Wind 30 deg - Service	17.45	3.18	-5.48	-470.99	-272.94	-0.09
Dead+Wind 60 deg - Service	17.45	5.51	-3.17	-272.66	-473.72	-0.16
Dead+Wind 90 deg - Service	17.45	6.37	0.00	-0.03	-547.37	-0.19
Dead+Wind 120 deg - Service	17.45	5.50	3.18	273.04	-472.83	-0.11
Dead+Wind 150 deg - Service	17.45	3.17	5.50	473.12	-272.40	-0.01
Dead+Wind 180 deg - Service	17.45	0.00	6.35	546.03	0.37	0.04
Dead+Wind 210 deg - Service	17.45	-3.17	5.50	473.12	273.15	0.08
Dead+Wind 240 deg - Service	17.45	-5.50	3.18	273.04	473.58	0.15
Dead+Wind 270 deg - Service	17.45	-6.37	0.00	-0.03	548.12	0.19
Dead+Wind 300 deg - Service	17.45	-5.51	-3.17	-272.66	474.46	0.13
Dead+Wind 330 deg - Service	17.45	-3.18	-5.48	-470.99	273.68	0.03

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-17.45	0.00	0.00	17.45	0.00	0.000%
2	0.00	-17.45	-16.07	0.00	17.45	16.07	0.000%
3	8.08	-17.45	-13.94	-8.08	17.45	13.94	0.000%
4	14.01	-17.45	-8.06	-14.01	17.45	8.06	0.000%
5	16.19	-17.45	0.00	-16.19	17.45	-0.01	0.022%
6	13.99	-17.45	8.08	-13.99	17.45	-8.08	0.000%
7	8.07	-17.45	13.99	-8.07	17.45	-13.99	0.000%
8	0.00	-17.45	16.15	0.00	17.45	-16.15	0.000%
9	-8.07	-17.45	13.99	8.07	17.45	-13.99	0.000%
10	-13.99	-17.45	8.08	13.99	17.45	-8.08	0.000%
11	-16.19	-17.45	0.00	16.19	17.45	-0.01	0.022%
12	-14.01	-17.45	-8.06	14.01	17.45	8.06	0.000%
13	-8.08	-17.45	-13.94	8.08	17.45	13.94	0.000%
14	0.00	-30.94	0.00	0.00	30.94	0.00	0.000%
15	0.00	-30.94	-4.94	0.00	30.94	4.94	0.000%
16	2.48	-30.94	-4.28	-2.48	30.94	4.28	0.000%
17	4.30	-30.94	-2.48	-4.30	30.94	2.48	0.000%
18	4.97	-30.94	0.00	-4.97	30.94	-0.00	0.000%
19	4.30	-30.94	2.48	-4.30	30.94	-2.48	0.000%
20	2.48	-30.94	4.30	-2.48	30.94	-4.30	0.000%
21	0.00	-30.94	4.96	0.00	30.94	-4.96	0.000%
22	-2.48	-30.94	4.30	2.48	30.94	-4.30	0.000%
23	-4.30	-30.94	2.48	4.30	30.94	-2.48	0.000%
24	-4.97	-30.94	0.00	4.97	30.94	-0.00	0.000%
25	-4.30	-30.94	-2.48	4.30	30.94	2.48	0.000%
26	-2.48	-30.94	-4.28	2.48	30.94	4.28	0.000%
27	0.00	-17.45	-6.32	0.00	17.45	6.32	0.000%
28	3.18	-17.45	-5.48	-3.18	17.45	5.48	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
29	5.51	-17.45	-3.17	-5.51	17.45	3.17	0.000%
30	6.37	-17.45	0.00	-6.37	17.45	-0.00	0.000%
31	5.50	-17.45	3.18	-5.50	17.45	-3.18	0.000%
32	3.17	-17.45	5.50	-3.17	17.45	-5.50	0.000%
33	0.00	-17.45	6.35	0.00	17.45	-6.35	0.000%
34	-3.17	-17.45	5.50	3.17	17.45	-5.50	0.000%
35	-5.50	-17.45	3.18	5.50	17.45	-3.18	0.000%
36	-6.37	-17.45	0.00	6.37	17.45	-0.00	0.000%
37	-5.51	-17.45	-3.17	5.51	17.45	3.17	0.000%
38	-3.18	-17.45	-5.48	3.18	17.45	5.48	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00059108
3	Yes	6	0.00000001	0.00015642
4	Yes	6	0.00000001	0.00016117
5	Yes	5	0.00000001	0.00014553
6	Yes	6	0.00000001	0.00015556
7	Yes	6	0.00000001	0.00015863
8	Yes	4	0.00000001	0.00059146
9	Yes	6	0.00000001	0.00015912
10	Yes	6	0.00000001	0.00015537
11	Yes	5	0.00000001	0.00014533
12	Yes	6	0.00000001	0.00016097
13	Yes	6	0.00000001	0.00015690
14	Yes	4	0.00000001	0.00001071
15	Yes	5	0.00000001	0.00010704
16	Yes	6	0.00000001	0.00029896
17	Yes	6	0.00000001	0.00031287
18	Yes	5	0.00000001	0.00017186
19	Yes	6	0.00000001	0.00029923
20	Yes	6	0.00000001	0.00030346
21	Yes	5	0.00000001	0.00010744
22	Yes	6	0.00000001	0.00031249
23	Yes	6	0.00000001	0.00030311
24	Yes	5	0.00000001	0.00017338
25	Yes	6	0.00000001	0.00031687
26	Yes	6	0.00000001	0.00030796
27	Yes	4	0.00000001	0.00025572
28	Yes	5	0.00000001	0.00064153
29	Yes	5	0.00000001	0.00067208
30	Yes	4	0.00000001	0.00084590
31	Yes	5	0.00000001	0.00063886
32	Yes	5	0.00000001	0.00065430
33	Yes	4	0.00000001	0.00025728
34	Yes	5	0.00000001	0.00065859
35	Yes	5	0.00000001	0.00063919
36	Yes	4	0.00000001	0.00084698
37	Yes	5	0.00000001	0.00067233
38	Yes	5	0.00000001	0.00064571

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	108 - 98.5	40.537	36	3.4435	0.0097
L2	98.5 - 98	33.754	36	3.2999	0.0055
L3	98 - 79.5	33.409	36	3.2965	0.0054

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L4	79.5 - 76.75	21.532	36	2.7260	0.0026
L5	76.75 - 64.17	19.997	36	2.6052	0.0023
L6	64.17 - 59.5	13.772	36	2.1059	0.0015
L7	59.5 - 47	11.799	36	1.9271	0.0013
L8	50.25 - 29.75	8.372	36	1.6091	0.0010
L9	29.75 - 13	2.831	36	0.9265	0.0005
L10	13 - 11.75	0.532	36	0.3878	0.0002
L11	11.75 - 0	0.435	36	0.3555	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	(2) LPA-80063/4CFx5 w/Mount Pipe	36	38.365	3.3871	0.0079	3251
103.00	A-ANT-18G-2-C	36	36.927	3.3532	0.0069	3251
99.00	(3) FV65-14-00NA2 w/Mount Pipe	36	34.101	3.3037	0.0056	2514
98.00	Platform Mount [LP 304-1]	36	33.409	3.2965	0.0054	2679
88.00	(4) 844G65VTZAS w/Mount Pipe	36	26.713	3.0709	0.0039	1800
77.00	KS24019-L112A	36	20.134	2.6160	0.0024	1394
76.00	3' Side Arm Mount	36	19.589	2.5730	0.0023	1433

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	108 - 98.5	102.072	11	8.6693	0.0245
L2	98.5 - 98	85.048	11	8.3117	0.0139
L3	98 - 79.5	84.181	11	8.3032	0.0137
L4	79.5 - 76.75	54.327	11	6.8749	0.0065
L5	76.75 - 64.17	50.462	11	6.5715	0.0058
L6	64.17 - 59.5	34.777	11	5.3163	0.0038
L7	59.5 - 47	29.802	11	4.8662	0.0033
L8	50.25 - 29.75	21.155	11	4.0650	0.0025
L9	29.75 - 13	7.159	11	2.3423	0.0012
L10	13 - 11.75	1.346	11	0.9810	0.0004
L11	11.75 - 0	1.100	11	0.8993	0.0004

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	(2) LPA-80063/4CFx5 w/Mount Pipe	11	96.622	8.5289	0.0201	1365
103.00	A-ANT-18G-2-C	11	93.013	8.4443	0.0175	1365
99.00	(3) FV65-14-00NA2 w/Mount Pipe	11	85.918	8.3212	0.0141	1051
98.00	Platform Mount [LP 304-1]	11	84.181	8.3032	0.0137	1118
88.00	(4) 844G65VTZAS w/Mount Pipe	11	67.358	7.7392	0.0098	741
77.00	KS24019-L112A	11	50.807	6.5987	0.0059	568
76.00	3' Side Arm Mount	11	49.436	6.4907	0.0057	583

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	KI/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
L1	108 - 98.5 (1)	TP8.625x8.625x0.3125	9.50	0.00	0.0	21.000	8.1608	-1.26	171.38	0.007
L2	98.5 - 98 (2)	TP16.5x8.625x0.3125	0.50	0.00	0.0	21.000	8.1608	-1.27	171.38	0.007
L3	98 - 79.5 (3)	TP19.4611x16.5x0.1875	18.50	0.00	0.0	39.000	11.4702	-5.08	447.34	0.011
L4	79.5 - 76.75 (4)	TP19.9012x19.4611x0.2137	2.75	0.00	0.0	39.000	13.3537	-5.35	520.79	0.010
L5	76.75 - 64.17 (5)	TP21.9153x19.9012x0.2777	12.58	0.00	0.0	39.000	19.0718	-6.75	743.80	0.009
L6	64.17 - 59.5 (6)	TP22.6623x21.9153x0.3196	4.67	0.00	0.0	39.000	22.6647	-7.35	883.92	0.008
L7	59.5 - 47 (7)	TP24.663x22.6623x0.3726	12.50	0.00	0.0	39.000	28.1114	-8.63	1096.35	0.008
L8	47 - 29.75 (8)	TP27.0487x23.3976x0.3879	20.50	0.00	0.0	39.000	32.8246	-12.03	1280.16	0.009
L9	29.75 - 13 (9)	TP29.7294x27.0487x0.4182	16.75	0.00	0.0	39.000	38.9067	-14.96	1517.36	0.010
L10	13 - 11.75 (10)	TP29.9695x29.7294x0.5047	1.25	0.00	0.0	39.000	47.2002	-15.22	1840.81	0.008
L11	11.75 - 0 (11)	TP31.81x29.9695x0.4236	11.75	0.00	0.0	39.000	42.1992	-17.44	1645.77	0.011

Pole Bending Design Data

Section No.	Elevation	Size	Actual M_x	Actual f_{bx}	Allow. F_{bx}	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y	Actual f_{by}	Allow. F_{by}	Ratio $\frac{f_{by}}{F_{by}}$
	ft		kip-ft	ksi	ksi		kip-ft	ksi	ksi	
L1	108 - 98.5 (1)	TP8.625x8.625x0.3125	29.20	21.421	23.100	0.927	0.00	0.000	23.100	0.000
L2	98.5 - 98 (2)	TP16.5x8.625x0.3125	29.20	21.421	23.100	0.927	0.00	0.000	23.100	0.000
L3	98 - 79.5 (3)	TP19.4611x16.5x0.1875	227.70	50.182	39.000	1.287	0.00	0.000	39.000	0.000
L4	79.5 - 76.75 (4)	TP19.9012x19.4611x0.2137	262.95	48.784	39.000	1.251	0.00	0.000	39.000	0.000
L5	76.75 - 64.17 (5)	TP21.9153x19.9012x0.2777	428.96	50.800	39.000	1.303	0.00	0.000	39.000	0.000
L6	64.17 - 59.5 (6)	TP22.6623x21.9153x0.3196	492.45	47.594	39.000	1.220	0.00	0.000	39.000	0.000
L7	59.5 - 47 (7)	TP24.663x22.6623x0.3726	621.38	45.573	39.000	1.169	0.00	0.000	39.000	0.000
L8	47 - 29.75 (8)	TP27.0487x23.3976x0.3879	921.69	51.558	39.000	1.322	0.00	0.000	39.000	0.000
L9	29.75 - 13 (9)	TP29.7294x27.0487x0.4182	1179.58	50.621	39.000	1.298	0.00	0.000	39.000	0.000
L10	13 - 11.75 (10)	TP29.9695x29.7294x0.5047	1199.26	42.320	39.000	1.085	0.00	0.000	39.000	0.000
L11	11.75 - 0 (11)	TP31.81x29.9695x0.4236	1387.03	51.212	39.000	1.313	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation	Size	Actual V	Actual f_v	Allow. F_v	Ratio $\frac{f_v}{F_v}$	Actual T	Actual f_{vt}	Allow. F_{vt}	Ratio $\frac{f_{vt}}{F_{vt}}$
	ft		K	ksi	ksi		kip-ft	ksi	ksi	
L1	108 - 98.5 (1)	TP8.625x8.625x0.3125	7.69	0.943	14.000	0.135	0.47	0.166	14.000	0.012
L2	98.5 - 98 (2)	TP16.5x8.625x0.3125	7.71	0.944	14.000	0.069	0.46	0.162	14.000	0.012
L3	98 - 79.5 (3)	TP19.4611x16.5x0.1875	12.75	1.112	26.000	0.086	0.45	0.049	26.000	0.002
L4	79.5 - 76.75 (4)	TP19.9012x19.4611x0.2137	12.89	0.965	26.000	0.074	0.46	0.041	26.000	0.002
L5	76.75 - 64.17 (5)	TP21.9153x19.9012x0.2777	13.49	0.707	26.000	0.054	0.45	0.026	26.000	0.001
L6	64.17 - 59.5 (6)	TP22.6623x21.9153x0.3196	13.71	0.605	26.000	0.047	0.45	0.021	26.000	0.001
L7	59.5 - 47 (7)	TP24.663x22.6623x0.3726	14.17	0.504	26.000	0.039	0.45	0.016	26.000	0.001
L8	47 - 29.75 (8)	TP27.0487x23.3976x0.3879	15.08	0.459	26.000	0.035	0.46	0.012	26.000	0.000
L9	29.75 - 13 (9)	TP29.7294x27.0487x0.4182	15.72	0.404	26.000	0.031	0.46	0.010	26.000	0.000
L10	13 - 11.75 (10)	TP29.9695x29.7294x0.5047	15.77	0.334	26.000	0.026	0.46	0.008	26.000	0.000
L11	11.75 - 0 (11)	TP31.81x29.9695x0.4236	16.20	0.384	26.000	0.030	0.47	0.008	26.000	0.000

Pole Interaction Design Data

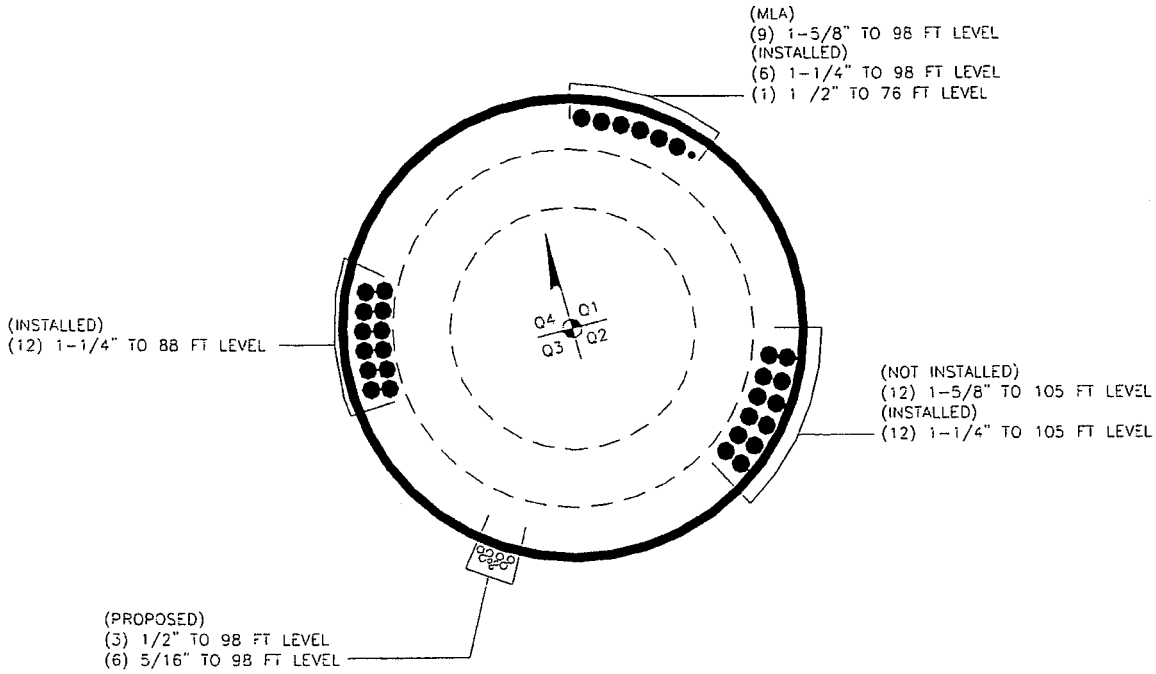
Section No.	Elevation ft	Ratio P / P_a	Ratio f_{bx} / F_{bx}	Ratio f_{by} / F_{by}	Ratio f_v / F_v	Ratio f_{vt} / F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	108 - 98.5 (1)	0.007	0.927	0.000	0.135	0.012	0.941 ✓	1.333	H1-3+VT ✓
L2	98.5 - 98 (2)	0.007	0.927	0.000	0.069	0.012	0.941 ✓	1.333	H1-3+VT ✓
L3	98 - 79.5 (3)	0.011	1.287	0.000	0.086	0.002	1.300 ✓	1.333	H1-3+VT ✓
L4	79.5 - 76.75 (4)	0.010	1.251	0.000	0.074	0.002	1.263 ✓	1.333	H1-3+VT ✓
L5	76.75 - 64.17 (5)	0.009	1.303	0.000	0.054	0.001	1.312 ✓	1.333	H1-3+VT ✓
L6	64.17 - 59.5 (6)	0.008	1.220	0.000	0.047	0.001	1.229 ✓	1.333	H1-3+VT ✓
L7	59.5 - 47 (7)	0.008	1.169	0.000	0.039	0.001	1.177 ✓	1.333	H1-3+VT ✓
L8	47 - 29.75 (8)	0.009	1.322	0.000	0.035	0.000	1.332 ✓	1.333	H1-3+VT ✓
L9	29.75 - 13 (9)	0.010	1.298	0.000	0.031	0.000	1.308 ✓	1.333	H1-3+VT ✓
L10	13 - 11.75 (10)	0.008	1.085	0.000	0.026	0.000	1.094 ✓	1.333	H1-3+VT ✓
L11	11.75 - 0 (11)	0.011	1.313	0.000	0.030	0.000	1.324 ✓	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	108 - 98.5	Pole	TP8.625x8.625x0.3125	1	-1.26	228.44	70.6	Pass
L2	98.5 - 98	Pole	TP16.5x8.625x0.3125	2	-1.27	228.44	70.6	Pass
L3	98 - 79.5	Pole	TP19.4611x16.5x0.1875	3	-5.08	596.30	97.5	Pass
L4	79.5 - 76.75	Pole	TP19.9012x19.4611x0.2137	4	-5.35	694.22	94.7	Pass
L5	76.75 - 64.17	Pole	TP21.9153x19.9012x0.2777	5	-6.75	991.49	98.5	Pass
L6	64.17 - 59.5	Pole	TP22.6623x21.9153x0.3196	6	-7.35	1178.27	92.2	Pass
L7	59.5 - 47	Pole	TP24.663x22.6623x0.3726	7	-8.63	1461.43	88.3	Pass
L8	47 - 29.75	Pole	TP27.0487x23.3976x0.3879	8	-12.03	1706.45	99.9	Pass
L9	29.75 - 13	Pole	TP29.7294x27.0487x0.4182	9	-14.96	2022.64	98.1	Pass
L10	13 - 11.75	Pole	TP29.9695x29.7294x0.5047	10	-15.22	2453.80	82.0	Pass
L11	11.75 - 0	Pole	TP31.81x29.9695x0.4236	11	-17.44	2193.81	99.3	Pass
							Summary	
						Pole (L8)	99.9	Pass
						RATING =	**99.9**	**Pass**

APPENDIX B

Cable Routing Drawing

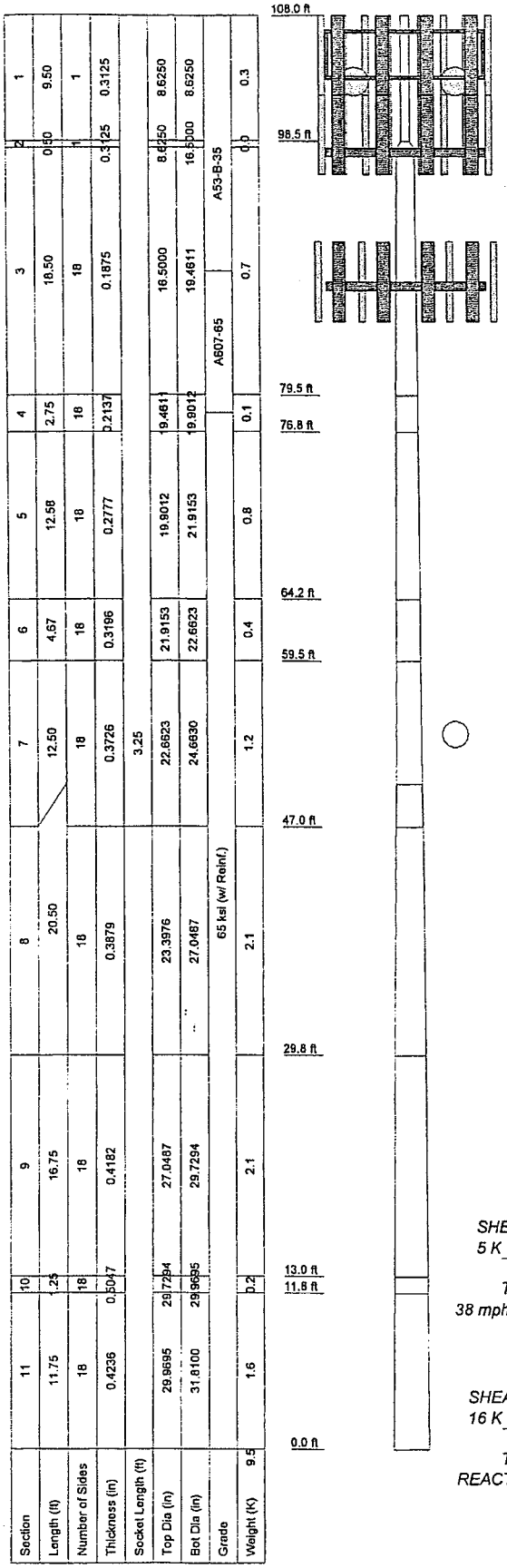


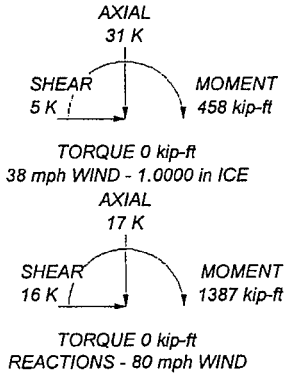
APPENDIX C

Table C1 - List of Attached Documents

Attachment
ERI Monopole Profile
Base Plate Calculations
Flange Plate Calculations
Foundation Calculations
Modification Drawings

Program Version 5.4.1.8 - 4/8/2010 File:T:/673_(TRI)_Tower Reinforcement Inc/_2010 TRI/67310-0013_876363_Hartford-NU (SSUSA)/FINAL_876363/67310-0013_FINAL.eri





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) LPA-80063/4CFx5 w/Mount Pipe	105	LLPX310R W/ MOUNT PIPE	99
(2) LPA-80063/4CFx5 w/Mount Pipe	105	LLPX310R W/ MOUNT PIPE	99
(2) LPA-80063/4CFx5 w/Mount Pipe	105	Wimax DAP Head	99
(2) Antel LPA-171080/8CFx2 w/ Mount Pipe	105	Wimax DAP Head	99
		Wimax DAP Head	99
(2) Antel LPA-171080/8CFx2 w/ Mount Pipe	105	(3) FV65-14-00NA2 w/Mount Pipe	99
		(3) FV65-14-00NA2 w/Mount Pipe	99
(2) Antel LPA-171080/8CFx2 w/ Mount Pipe	105	Motorola Timing 2000	99
		(3) FV65-14-00NA2 w/Mount Pipe	99
(2) TMA	105	LLPX310R W/ MOUNT PIPE	99
(2) TMA	105	Platform Mount [LP 304-1]	98
(2) TMA	105	(4) 844G65VTZAS w/Mount Pipe	88
Sector Mount [SM 308-3]	105	Platform Mount [LP 303-1]	88
Horizon Compact	103	(4) 844G65VTZAS w/Mount Pipe	88
Horizon Compact	103	(4) 844G65VTZAS w/Mount Pipe	88
A-ANT-18G-2-C	103	KS24019-L112A	77
A-ANT-18G-2-C	103	3' Side Arm Mount	76

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	65 ksi (w/ Reinf.)	65 ksi	80 ksi
A607-65	65 ksi	80 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 38 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: 99.9%

Paul J Ford and Company
250 E. Broad Street Suite 1500
Columbus, Ohio 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: *108' MP; Hartford, CT; HARTFORD-NU (SSUSA)*			
Project: *BU 876363 (PJF 67310-0013)*			
Client: Crown Castle	Drawn by: Joshua Frybarger	App'd:	
Code: TIA/EIA-222-F	Date: 05/21/10	Scale: NTS	
Path: T:\67310-0013 876363 Hartford-NU (SSUSA)\FINAL 876363\67310-0013 FINAL.eri		Dwg No. E-1	

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

Site Data

BU#: *876363*
Site Name: *HARTFORD-NU (SSUSA)*
App #: *87974*

Connection Type:	*Butt*
Pole Manufacturer:	Other

Reactions		
Moment:	29.2	ft-kips
Axial:	1.3	kips
Shear:	7.7	kips
Elevation:	98	feet

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

Bolt Data			
Qty:	9		
Diameter (in.):	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty:
N/A:	55	<-- Disregard	44.00
Circle (in.):	19.5		

Plate Data		
Diam:	24	in
Thick, t:	1	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	3.01	in

Stiffener Data (Welding at Both Sides)		
Config:	2	*
Weld Type:	Groove	
Groove Depth:	0.1875	in **
Groove Angle:	45	degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:	0.25	in
Width:	7.5	in
Height:	9	in
Thick:	0.375	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	60	ksi

Pole Data		
Diam:	8.625	in
Thick:	0.3125	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

			Stiffened
Bolt Tension Capacity, B:	25.91 kips		Service, ASD
Max Bolt directly applied T:	7.84 Kips		Fty*ASIF
Min. PL "tc" for B cap. w/o Pry:	Stiffened in		
Min PL "treq" for actual T w/ Pry:	Stiffened in		
Min PL "t1" for actual T w/o Pry:	Stiffened in		
T allowable	25.91 kips	<-- B, Stiffened	
Prying Force, Q:	0.00 kips	Stiffened	
Total Bolt Tension=T+Q:	7.84 kips		
Non-Prying Bolt Stress Ratio, T/B:	30.3% **Pass**		

Exterior Flange Plate Results Flexural Check

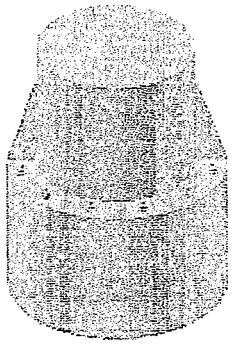
		Stiffened
Compression Side Plate Stress:	12.9 ksi	Service, ASD
Allowable Plate Stress:	50.0 ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	25.9% **Pass**	Comp. Y.L. Length:
Stiffened		N/A, Roark
Tension Side Stress Ratio, (treq/t)^2:	N/A	

Stiffener Results

Horizontal Weld :	22.7% **Pass**
Vertical Weld:	33.9% **Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	27.0% **Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	24.1% **Pass**
Plate Comp. (AISC Bracket):	63.8% **Pass**

Pole Results

Pole Punching Shear Check:	19.3% **Pass**



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

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

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

Site Data

BU#: *876363*
Site Name: *HARTFORD-NU (SSUSA)*
App #: *87974*

Connection Type:	*Butt*
Pole Manufacturer:	Other

Reactions		
Moment:	29.2	ft-kips
Axial:	1.3	kips
Shear:	7.7	kips
Elevation:	98	feet

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

Bolt Data			
Qty:	9		
Diameter (in.):	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty: 44.00
N/A:	55	<-- Disregard	
Circle (in.):	19.5		

Flange Bolt Results

			Non-Rigid
Bolt Tension Capacity, B:	25.91	kips	Service, ASD
Max Bolt directly applied T:	7.84	Kips	Fty*ASIF
Min. PL "tc" for B cap. w/o Pry:	0.919	in	
Min PL "treq" for actual T w/ Pry:	0.371	in	
Min PL "t1" for actual T w/o Pry:	0.505	in	
T allowable with Prying:	23.03	kips	0≤α'≤1 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	7.84	kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	30.3%	**Pass**	

Plate Data		
Diam:	24	in
Thick, t:	0.75	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	5.82	in

Exterior Flange Plate Results Flexural Check

			Non-Rigid
Compression Side Plate Stress:	14.3	ksi	Service ASD
Allowable Plate Stress:	36.0	ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	39.8%	**Pass**	Comp. Y.L. Length:
No Prying			10.39
Tension Side Stress Ratio, (treq/t)^2:	24.4%	**Pass**	

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

n/a

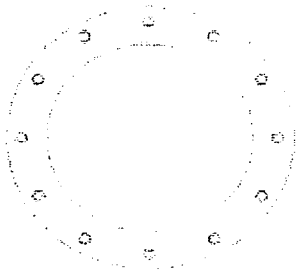
Stiffener Results

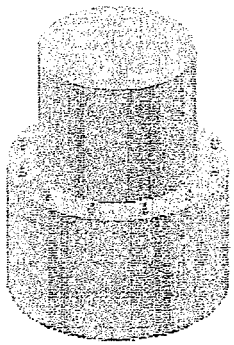
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	16.5	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None





Stress Increase Factor		
ASIF:	1.333	

* 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

Square, Unstiffened Base Plate, Any Rod Material - Rev. F

Assumptions: Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48.
Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)

Site Data

BU#: *876363*
Site Name: *HARTFORD-NU (SSU*
App #: *87974*

Reactions		
Moment:	1044.5	ft-kips *
Axial:	17	kips
Shear:	16	kips

*ADJUSTED TO ACCOUNT FOR ADDITIONAL ANCHORS

Connection Type:	*Butt*

Anchor Rod Data		
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Grade(Fy):	75	ksi
Bolt Circle:	38	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	36	in
Thick:	2.5	in
Grade:	55	ksi
B effective	19.10	in

Pole Data		
Diam:	31.81	in
Thick:	0.3125	in
Grade:	65	ksi

Stress Increase Factor		
ASIF:	1.333	

ADDITIONAL ANCHORS
MAX TENSION: 177.3 KIPS
ALLOW TENSION: 195.0 KIPS
STRESS RATIO: 90.9%

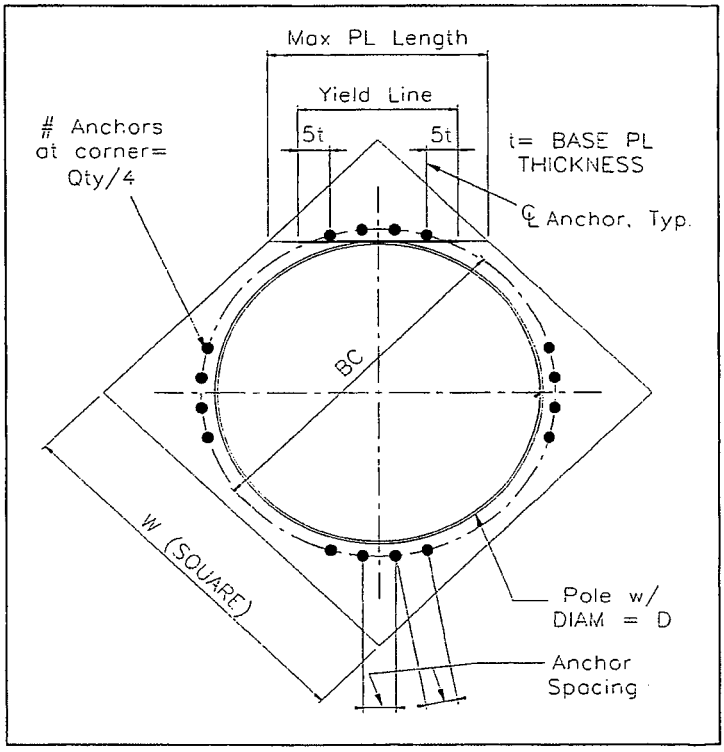
Anchor Rod Results

Maximum Rod Tension:	162.8 Kips	
Allowable Tension:	195.0 Kips	
Anchor Rod Stress Ratio:	83.5%	**Pass**

Base Plate Results

Base Plate Stress:	47.4 ksi	
Allowable Plate Stress:	55.0 ksi	
Base Plate Stress Ratio:	86.2%	**Pass**

PL Ref. Data
Yield Line (in):
19.10
Max PL Length:
19.10



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

Date: 5/21/2010
PJF Project: 67310-0013
Client Ref. # BU 876363
Site Name: HARTFORD-NU (SSUSA)
Description: 108' MP
Owner: CCI
Engineer: JJF

ASYMMETRIC ANCHOR ROD ANALYSIS

Degree =	359.000	
y-bar =	-0.023	in = $\sum A\,y / \sum A$
x-bar =	1.300	in = $\sum A\,x / \sum A$

Item	Anchor Dia., in	Location, degrees	Bolt Circle, in	Area, in^2	Moment, ft-kips	Max Load, kips
1	**2.250**	**38.0**	**38.00**	3.98	**1387**	144.02
2	**2.250**	**52.0**	**38.00**	3.98	1387	138.63
3	**2.250**	**128.0**	**38.00**	3.98	1387	154.15
4	**2.250**	**142.0**	**38.00**	3.98	1387	162.85
5	**2.250**	**218.0**	**38.00**	3.98	1387	162.85
6	**2.250**	**232.0**	**38.00**	3.98	1387	154.15
7	**2.250**	**308.0**	**38.00**	3.98	1387	138.63
8	**2.250**	**322.0**	**38.00**	3.98	1387	144.02
9	**2.250**	**0.0**	**43.81**	3.98	1387	177.31
10	**2.250**	**100.0**	**43.81**	3.98	1387	157.73
11	**2.250**	**260.0**	**43.81**	3.98	1387	157.73
				43.74		162.85

PJF job no. **67310-0013** Project name **HARTFORD-NU (SSUSA) BU 876363**

Foundation Loads:

Pole weight or tower leg compression =	**17**	(kips)
Horizontal load at top of pier =	**16**	(kips)
Overturning moment at top of pier=	**1387**	(ft-kips)

Design criteria:

Safety factor against overturning =	**1.5**	

Soil Properties:

Soil density =	**115**	(pcf)
Allowable soil bearing =	**2.3**	(ksf)
Depth to water table =	**99**	(ft)

Dimensions:

Pier shape (round or square)	**S**	("R" or "S")
Pier width =	**5**	(ft)
Pier height above grade =	**0.5**	(ft)
depth to bottom of footing =	**7**	(ft)
Footing thickness =	**3**	(ft)
Footing width =	**21.5**	(ft)
Footing length =	**21.5**	(ft)

Concrete:

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

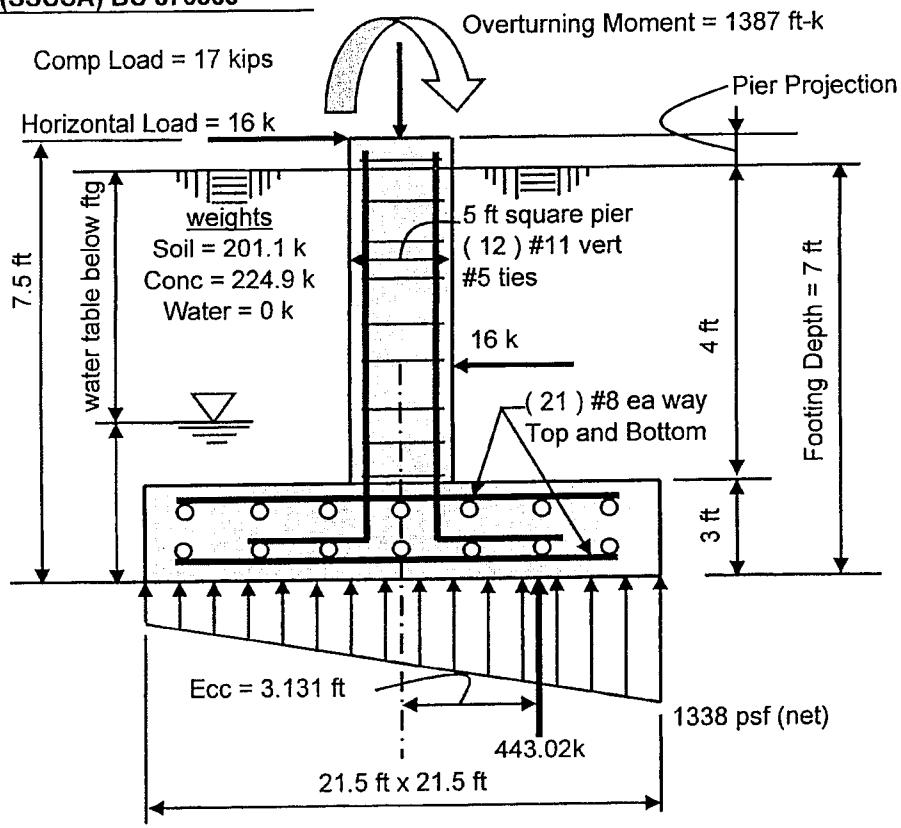
Reinforcing Steel:

	Pad	
minimum cover over rebar =	**4**	inches
size of pad rebar =	**#8**	bar
quantity of pad rebar =	**21**	(ea direction)

Reinforcing Steel:

	Pier	
size of vert rebar in pier=	**#11**	bar
vertical rebar quantity =	**12**	
size of pier ties =	**#5**	bar
minimum cover over rebar =	**4**	inches

Total volume of concrete = 55.5 cu yd



Summary of analysis results	
Maximum Net Soil Bearing = 1.338 ksf Allowable Net Soil Bearing = 2.3 ksf **Soil Bearing Stress Ratio = 0.58 Okay**	Ult Bending Shear Capacity = 110 psi Ult Bending Shear Stress = 18 psi **Bending Shear Stress Ratio = 0.16 Okay**
Ftg Overturning Resistance = 4762 ft-kips Overturning Moment = 1387 ft-kips Required Overturning Safety Factor = 1.5 Overturning Safety Factor = 3.434 **Ratio = 0.44 Okay**	Pad Bending Moment Capacity= 2221 ft-k Pad Bending Moment = 639 ft-k **Bending Moment Stress Ratio = 0.29 OK**

General Information:
==========
File Name: t:\673_tri_2010 tri\67310-0013_876363_hartford-nu (ssusa...\37510-0028.col
Project: 37510-0028
Column: Engineer: JJF
Code: ACI 318-02 Units: English

Run Option: Investigation Slenderness: Not considered
Run Axis: X-axis Column Type: Structural

Material Properties:
==========
f'c = 3 ksi fy = 60 ksi
Ec = 3122.02 ksi Es = 29000 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

Section:
==========
Rectangular: Width = 60 in Depth = 60 in

Gross section area, Ag = 3600 in^2
Ix = 1.08e+006 in^4 Iy = 1.08e+006 in^4
Xo = 0 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; #5 ties with #10 bars, #5 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Rectangular
Pattern: All Sides Equal (Cover to transverse reinforcement)
Total steel area: As = 18.72 in^2 at rho = 0.52% (Note: rho < 1.0%)
12 #11 Cover = 4 in

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

No.	Pu kip	Mux k-ft	fMnx k-ft	fMn/Mu	N.A. depth in	eps_t	Phi
1	17.00	1888.50	2274.60	1.204	5.66	0.02598	0.900

*** End of output ***

CROWN CASTLE USA PROJECT: HARTFORD-NU (SSUSA); HARTFORD, CT; BU #876363
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 38 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 USA ("CCUSA", OWNER). 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 USA 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 CCUSA CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CCUSA GUIDELINES FROM CCUSA. PER THE 12-01-2005 CCUSA DIRECTIVE: "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CCUSA 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 CCUSA 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 CCUSA 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 CCUSA 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 CCUSA REPRESENTATIVES, CAN THE CONTRACTOR PROCEED WITH THE FIELD WELDING ON THE STRUCTURE.
6. **CAUTION: THE CONTRACTOR SHALL CAREFULLY FOLLOW ALL CCUSA 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 DOCUMENT ENG-SOW-10066 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.

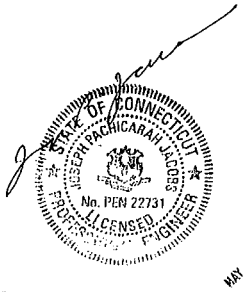
B. FOUNDATIONS, CONCRETE, AND SOIL PREPARATION - (NOT REQUIRED)

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 DOCUMENTS ENG-SOW-10033 AND ENG-BUL-10051 FOR SPECIFICATIONS.



ISSUE DATE FOR PRELIM: 5-20-2010

MONOPOLE REINFORCEMENT AND RETROFIT PROJECT
BU #876363; HARTFORD-NU (SSUSA); HARTFORD, CT

Revisions:

TOWER REINFORCEMENT, INC.
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Job No.	63710-0013
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SHEET NO:	S-1

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C. **SPECIAL INSPECTION AND TESTING - CONTINUED**

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.

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.
5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO THE OWNER'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65 (FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
7. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION I NOTES REGARDING TOUCH-UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.
8. UNLESS OTHERWISE NOTED, ALL STEEL MEMBERS SHALL BE HOT-DIP GALVANIZED, AFTER FABRICATION, IN ACCORDANCE WITH ASTM A123. SEE SECTION J FOR FURTHER NOTES AND FOR EXCEPTIONS (IF ANY).
9. ALL WELDS SHALL BE VISUALLY INSPECTED BY THE OWNER'S APPROVED TESTING AGENCY. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT. THE CONTRACTOR SHALL COOPERATE WITH THE TESTING AGENCY IN THEIR TESTING EFFORTS.
10. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
11. FIELD CUTTING OF STEEL:
   (A.) PRIOR TO ANY FIELD CUTTING, THE CONTRACTOR SHALL MARK THE CUT OUTLINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS.
   (B.) ANY REQUIRED CUTS IN THE STEEL SHALL BE CAREFULLY CUT BY MECHANICAL METHODS SUCH AS DRILLING, SAW CUTTING, AND GRINDING. THE CONTRACTOR IS RESPONSIBLE TO PREVENT ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, DURING THE CUTTING WORK. ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
   (C.) ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.

E. **BASE PLATE GROUT**

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

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

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

H. **EPOXY GROUTED REINFORCING ANCHOR RODS**

1. UNLESS OTHERWISE NOTED, REINFORCING ANCHOR RODS SHALL BE 150 KSI ALL-THREAD BAR CONFORMING TO ASTM A722. RECOMMENDED MANUFACTURERS/SUPPLIERS OF 150 KSI ALL-THREAD BAR ARE WILLIAMS FORM ENGINEERING CORPORATION AND DYWIDAG SYSTEMS INTERNATIONAL.
2. ALL REINFORCING ANCHOR RODS SHALL BE HOT DIP GALVANIZED PER ASTM A153. ALTERNATIVELY, ALL REINFORCING ANCHOR RODS MAY BE EPOXY COATED PER ASTM A775.
3. THE CORE-DRILLED HOLES IN THE CONCRETE FOR THE ANCHOR RODS SHALL BE CLEAN AND DRY, AND OTHERWISE PROPERLY PREPARED ACCORDING TO THE ANCHOR ROD AND EPOXY MANUFACTURERS' INSTRUCTIONS, PRIOR TO PLACEMENT OF ANCHOR RODS AND EPOXY. CONTRACTOR SHALL FOLLOW ALL ANCHOR ROD AND EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF RODS, EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST-INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.
4. ULTRABOND 1, HILTI HIT RE-500 OR ANCHORTITE EPOXY SHALL BE USED TO ANCHOR THE 150 KSI ALL-THREAD BAR IN THE DRILL HOLES. IF CONTRACTOR WISHES TO USE A DIFFERENT EPOXY, A REQUEST INCLUDING THE EPOXY TECHNICAL DATA SHEET(S) SHALL BE SUBMITTED TO PAUL J FORD AND COMPANY FOR REVIEW PRIOR TO CONSTRUCTION. AS NOTED ABOVE, FOLLOW ALL EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST-INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.
5. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN INSTALLED AND ALL EPOXY AND GROUT HAVE CURED (IF BASE PLATE AND/OR BEARING PLATES HAVE BEEN GROUTED PRIOR TO TESTING), ALL REINFORCING ANCHOR RODS SHALL BE LOAD TESTED PER CROWN ENGINEERING DOCUMENT #ENG-PRC-10119. REFER TO THE NEW ANCHOR & BRACKET DETAIL ON FOLLOWING DRAWING SHEETS FOR SPECIFIED ANCHOR ROD PROOF LOAD.
6. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN SUCCESSFULLY LOAD TESTED AND APPROVED AND BASE PLATE / BEARING PLATE GROUT HAS CURED (IF BASE PLATE AND/OR BEARING PLATES HAVE BEEN GROUTED AFTER TESTING), CONTRACTOR SHALL TIGHTEN ALL HEAVY HEX ANCHOR NUTS TO SNUG TIGHT PLUS ¼ TURN OF NUT.

I. **TOUCH UP OF GALVANIZING**

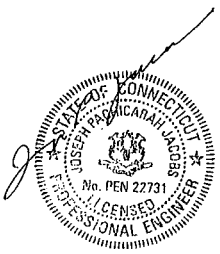
1. THE CONTRACTOR SHALL TOUCH UP ANY AND/OR ALL AREAS OF GALVANIZING ON THE EXISTING STRUCTURE OR NEW COMPONENTS THAT ARE DAMAGED OR ABRADED DURING CONSTRUCTION. **GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS ELL AS ANY AND ALL ABRASIONS, CUTS, FIELD DRILLING, AND ALL 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".



MAY 21 2010

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Checked By:	
SHEET NO:	S-2

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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#63710-0013), DATED 5-20-2010.

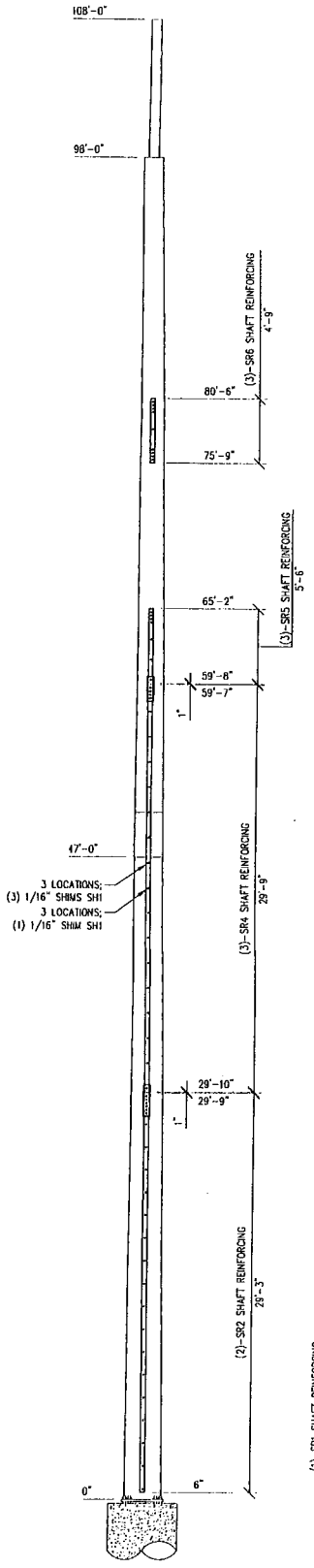
POLE SPECIFICATIONS	
Pole Shape Type:	18-SIDED POLYGON
Taper:	0.160051 IN/FT
Shaft Steel:	ASTM A572 GRADE 65
Base PL Steel:	ASTM A572 GRADE 55 (55 KSI)
Anchor Rods:	2 1/4"ø #18J ASTM A615 GRADE 75

SHAFT SECTION DATA					
Shaft Section	Section Length (feet)	Plate Thickness (in.)	Lap Splice (in.)	Diameter Across Flats (inches) @ Top	Diameter Across Flats (inches) @ Bottom
1	10.00	0.3125	39.00	8.625	8.625
2	51.00	0.1875		16.500	24.663
3	50.25	0.2500		23.767	31.810
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES					

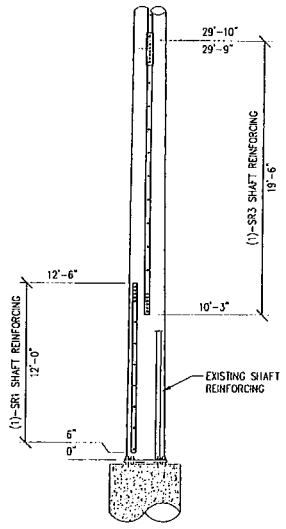
CONTRACTOR SHALL PROVIDE ASTM A36 SHIM PLATES BELOW SLIP JOINTS. THE SHIM PLATES SHALL BE PLACED BETWEEN THE NEW SHAFT REINFORCEMENT AND THE EXISTING POLE SHAFT FROM THE SLIP JOINT TO THE NEW SHAFT REINFORCEMENT SPLICE PLATE LOCATION AND A EXTRA LONG "SPLICE SHIM" SHALL BE PLACED BETWEEN THE NEW UPPER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

THIS FLAT PLATE BOLT-ON REINFORCING SYSTEM IS PROPRIETARY TO TOWER REINFORCEMENT, INC. PLEASE CONTACT TOWER REINFORCEMENT, INC. FOR ALL MATERIAL AND INSTALLATION PRICING.

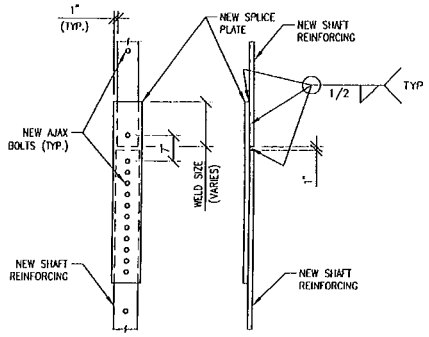
TIGHTEN ALL STRUCTURAL BOLTS, INCLUDING THE AJAX M20 BOLTS WITH SHEAR SLEEVES, ACCORDING TO THE REQUIREMENTS OF THE AISC "TURN OF THE NUT" METHOD. TIGHTEN BOLTS 1/3 TURN PAST THE SNUG TIGHT CONDITION AS DEFINED BY AISC.



POLE ELEVATION 1 S-3
(FLATS #2 & 8)



POLE ELEVATION 2 S-3
(FLAT #14)



DETAIL 3 S-3

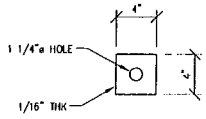


PLATE MK~SH1
(A36; 12 REQUIRED)

ISSUE DATE FOR PRELIM: 5-20-2010

STATE OF CONNECTICUT
JOSEPH PAUL CARAHER JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER
MAY 21 2010

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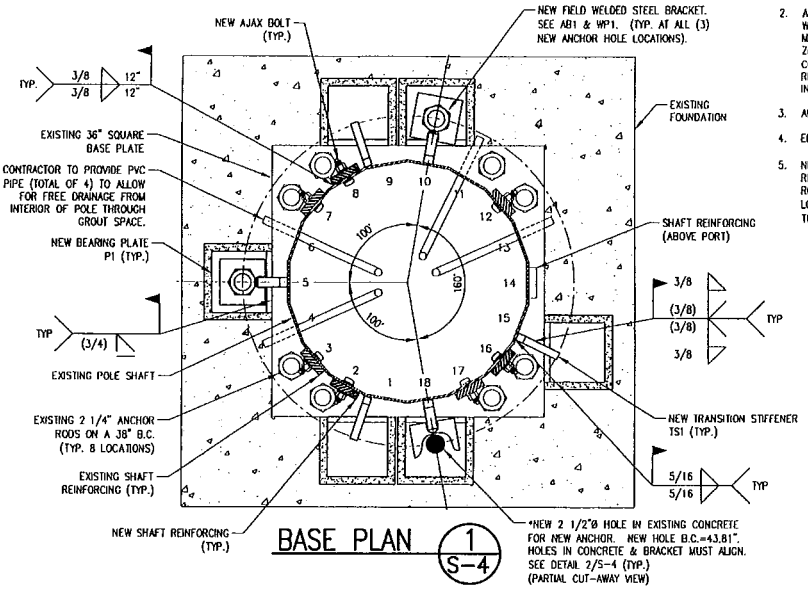
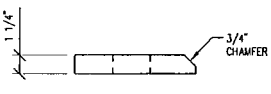
GENERAL NOTES:

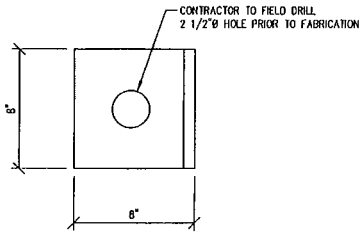
1. AJAX BOLTS ARE TO BE 20 mm Ø WITH CORRESPONDING 31 mm Ø SHEAR SLEEVE WITH MATCHING STEEL GRADE.
2. ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
3. ALL SHAFT REINFORCING IS, A572 GR 65.
4. EPOXY MUST BE HILTI RE-500.
5. NEW ANCHOR ROD REINFORCING SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. ONCE ALL RESIN AND GROUT HAVE CURED, ALL NEW ANCHOR ROD REINFORCING SHALL BE PROOF LOADED TO 230 KIPS. ONCE THE PROOF LOAD HAS BEEN RELEASED, TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/4 TURN OF NUT (REFER TO THE NEW ANCHOR & BRACKET DETAIL).

PROVIDE NON-SHRINK GROUT (NS GROUT BY EUCLID OR APPROVED, EQUAL; 7500 PSI MIN.) BELOW EXIST. BASE PLATE AND NEW ANCHOR BRACKETS. 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.



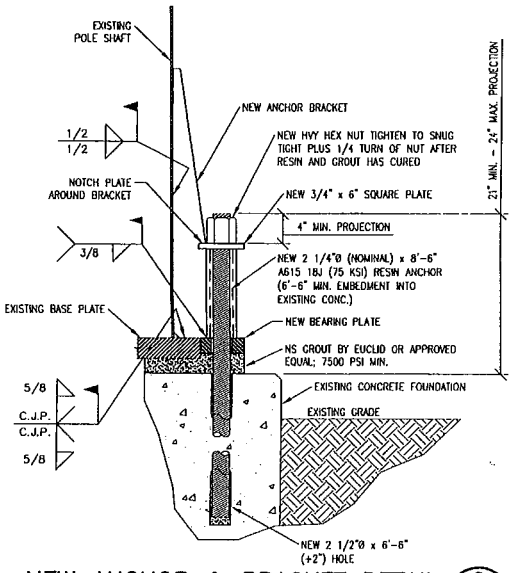
BASE PLAN 1/S-4



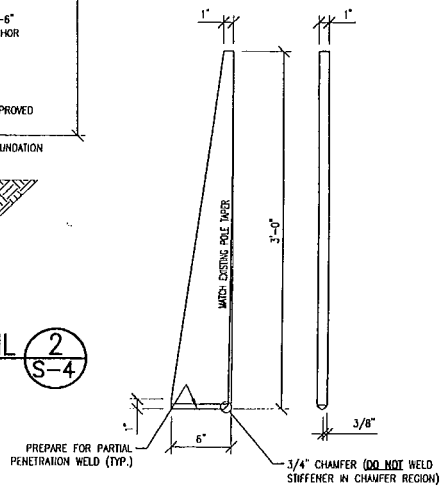


BEARING PLATE MK~P1

(6 REQUIRED) (Fy = 50 KSI)

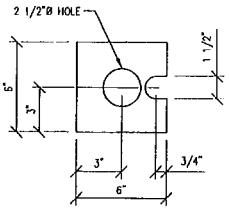


NEW ANCHOR & BRACKET DETAIL 2/S-4



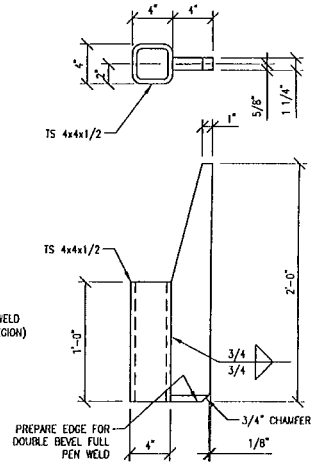
STIFFENER MK~TS1

(Fy = 50 KSI) (3 REQUIRED)



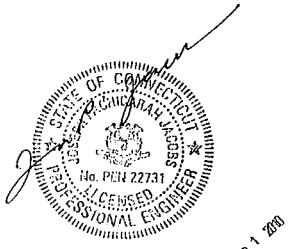
WASHER PLATE MK~WP1

(3 REQUIRED) (Fy = 50 KSI)



NEW ANCHOR BRACKET MK~AB1

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



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(614) 221-6679 www.pjfweb.com

Job No.	63710-0013
Date:	5-20-2010
Scale:	N.T.S.
Designed By:	J.J.F.
Drawn By:	B.M.S.
Checked By:	
SHEET NO:	S-4

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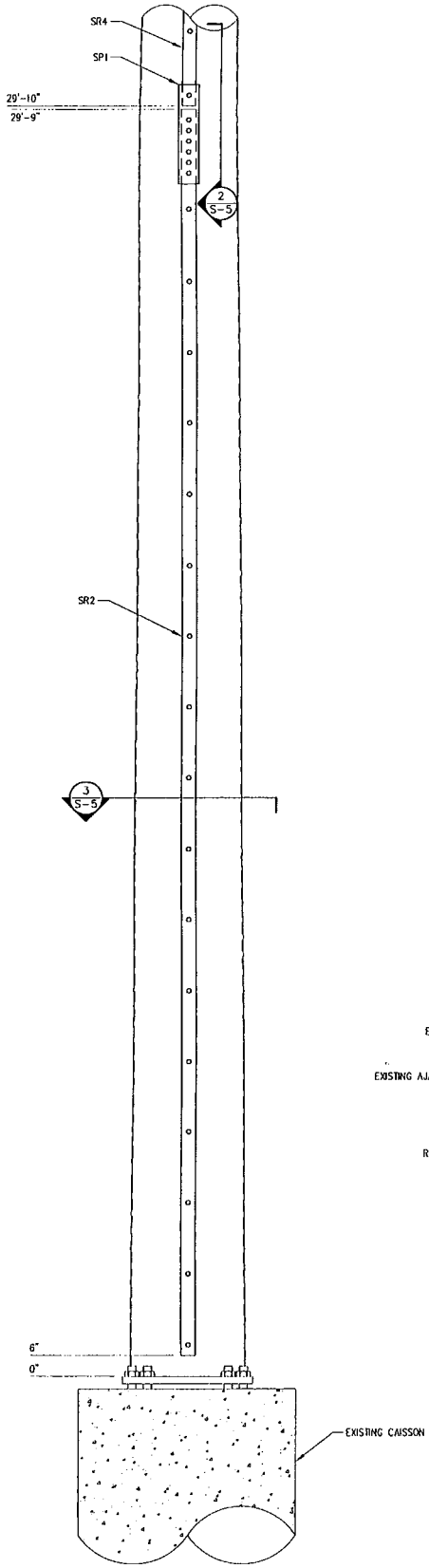
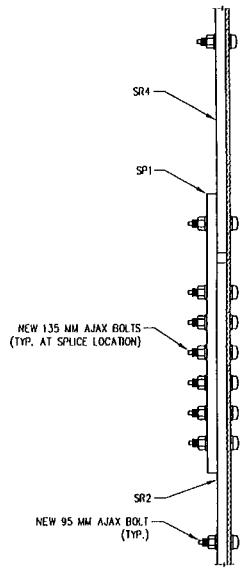
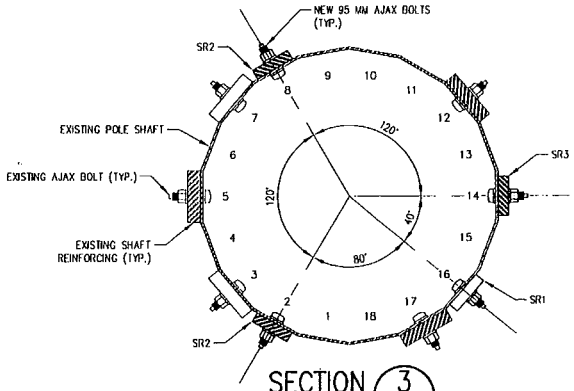


PARTIAL ELEVATION 1 S-5

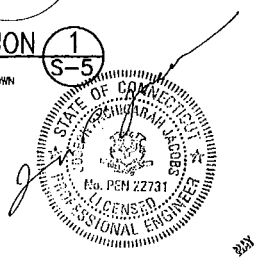
(FLATS #2 & 8)
(NEW BASE PLATE REINFORCING NOT SHOWN FOR CLARITY)



SECTION 2 S-5



SECTION 3 S-5



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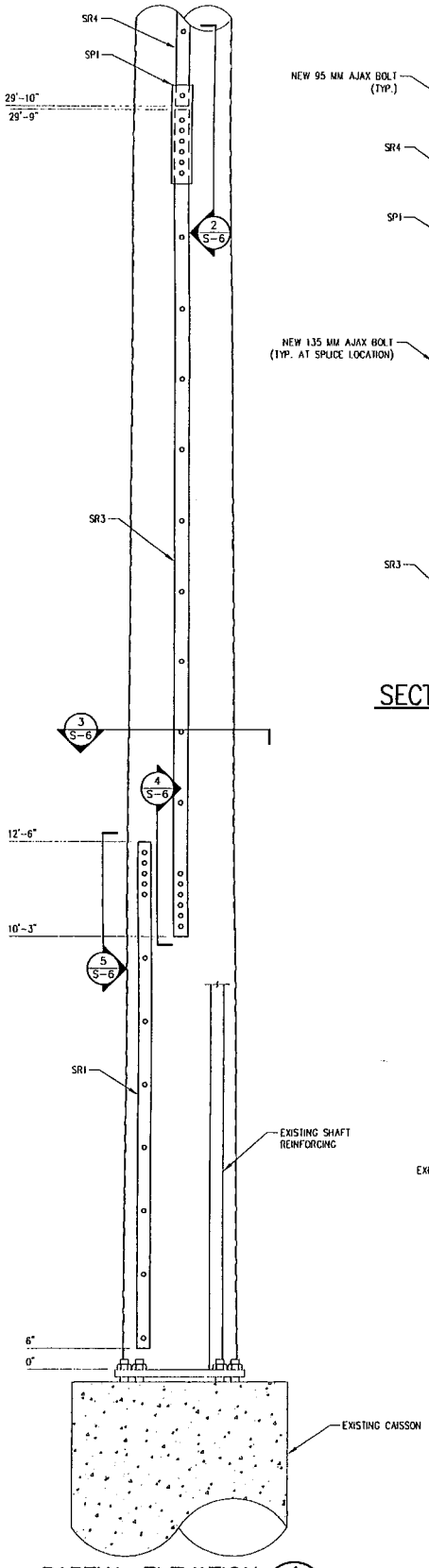
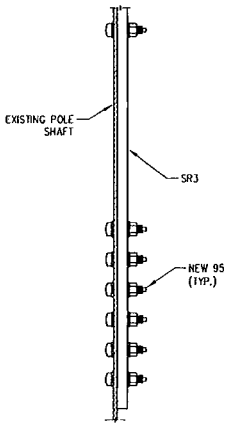


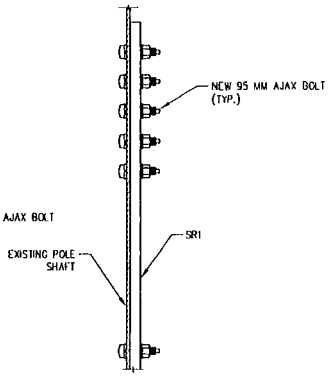
PARTIAL ELEVATION 1 S-6

(FLAT #14)
(NEW BASE PLATE REINFORCING NOT SHOWN FOR CLARITY)

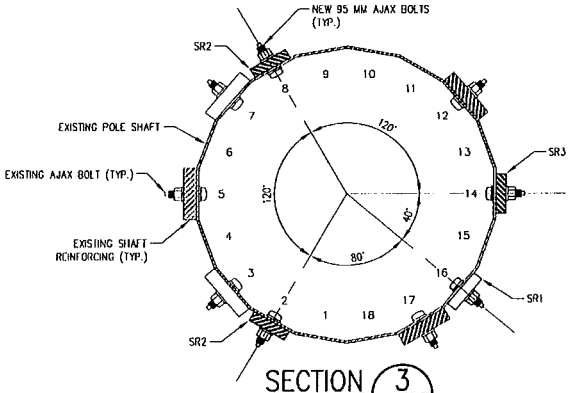
SECTION 2 S-6



SECTION 4 S-6



SECTION 5 S-6



SECTION 3 S-6

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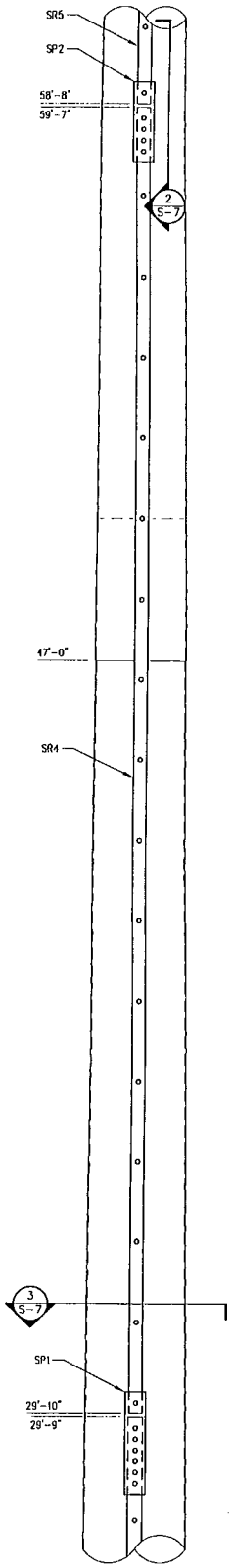
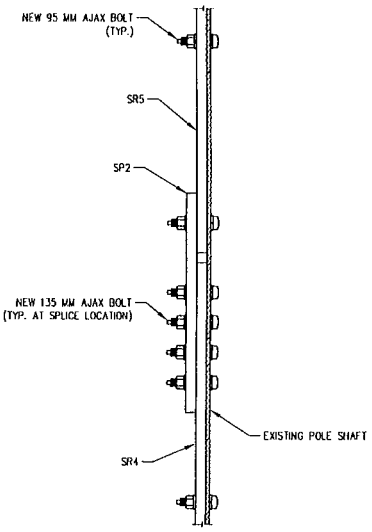
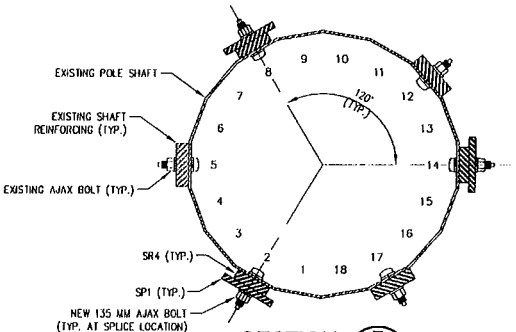


PARTIAL ELEVATION 1 S-7
(FLATS #2, 8 & 14)



SECTION 2 S-7



SECTION 3 S-7

STATE OF CONNECTICUT
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER
MAY 21 2010

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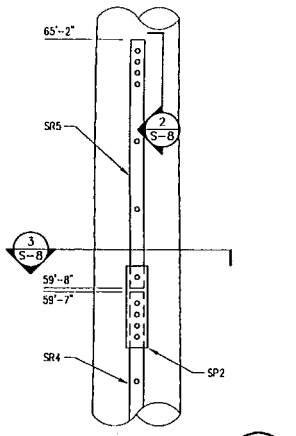
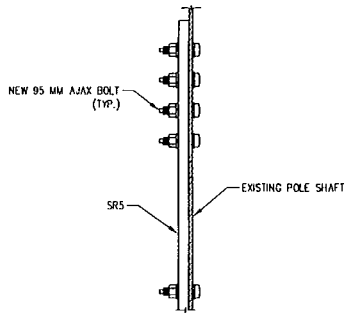
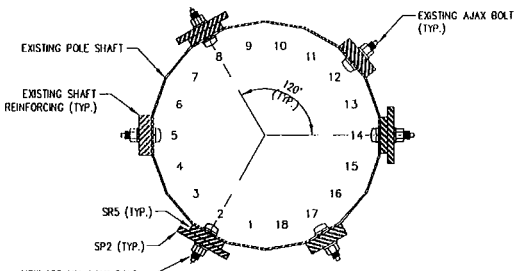


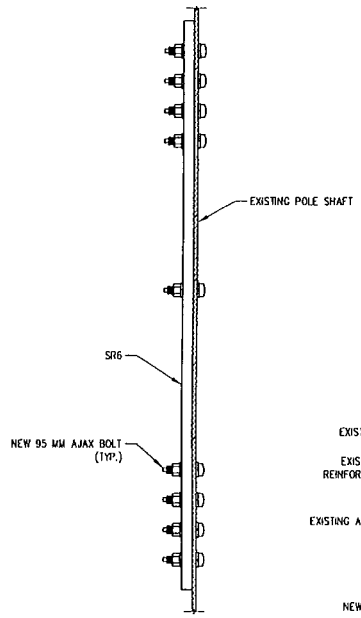
PARTIAL ELEVATION 1 S-8
(FLATS #2, 8 & 14)



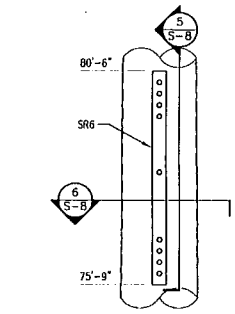
SECTION 2 S-8



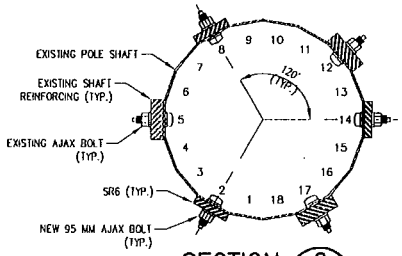
SECTION 3 S-8



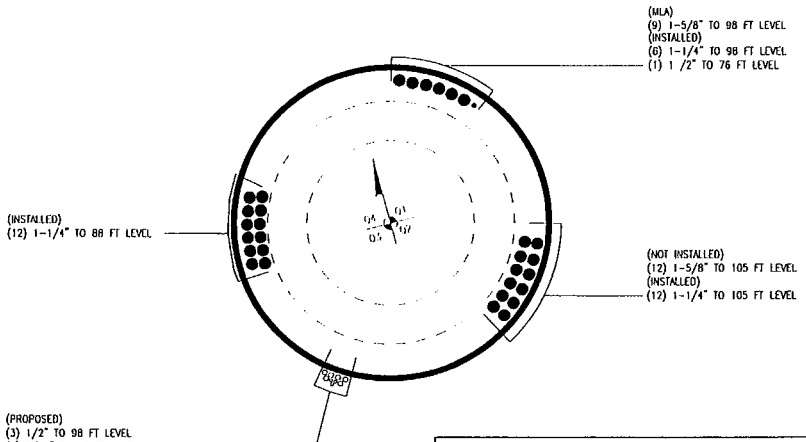
SECTION 5 S-8



PARTIAL ELEVATION 4 S-8
(FLATS #2, 8 & 14)



SECTION 6 S-8



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STATE OF CONNECTICUT
JAMES J. FORD
NO. PE-19 22731
LICENSED PROFESSIONAL ENGINEER
MAY 21 2010

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TOWER MODIFICATIONS MATERIAL LIST				
MARK	QTY	MATERIAL	APPROX. LENGTH	STEEL WEIGHT
AB1	3	ANCHOR BRACKET	2'-0"	167
P1	6	BEARING PLATE 1 1/4" x 8"	0'-8"	134
SH1	12	SHIM PLATE 1/16" x 4"	0'-4"	4
SP1	3	SPLICE PLATE 5/8" x 6"	2'-4"	90
SP2	3	SPLICE PLATE 5/8" x 5 5/8"	1'-10"	66
SR1	1	SHAFT REINFORCING PLATE 3/4" x 3 5/8"	12'-0"	116
SR2	2	SHAFT REINFORCING PLATE 1" x 4 1/2"	29'-3"	912
SR3	1	SHAFT REINFORCING PLATE 1" x 4 1/2"	19'-6"	299
SR4	3	SHAFT REINFORCING PLATE 1" x 4"	29'-9"	1215
SR5	3	SHAFT REINFORCING PLATE 3/4" x 3 5/8"	5'-6"	153
SR6	3	SHAFT REINFORCING PLATE 3/4" x 3 5/8"	4'-9"	132
TS1	3	TRANSITION STIFFENER 1" x 6"	3'-0"	184
WP1	3	WASHER PLATE 3/4" x 6"	0'-6"	23
	45	AJAX BOLT SLEEVE	5/8"	
	12	AJAX BOLT SLEEVE	3/4"	
	15	AJAX BOLT SLEEVE	7/8"	
	74	AJAX BOLT SLEEVE	1"	
	3	AJAX BOLT SLEEVE	1 1/8"	
	15	AJAX BOLT SLEEVE	1 1/2"	
	21	AJAX BOLT SLEEVE	1 5/8"	
	36	20 mmØ STANDARD AJAX BOLTS	135 mm	
	149	20 mmØ STANDARD AJAX BOLTS	95 mm	
	3	2 1/4"Ø ANCHOR BOLTS	9'-0"	
	3	2 1/4"Ø ANCHOR NUTS		
			TOTAL (lbs.)	3495

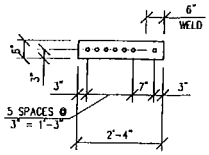

PLATE MK~SP1
(3 REQUIRED)

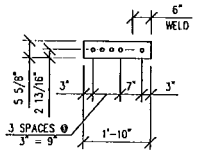

PLATE MK~SP2
(3 REQUIRED)

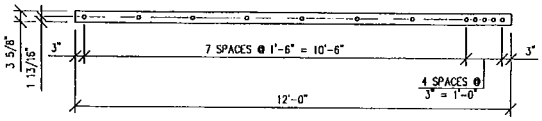

PLATE MK~SR1
(1 REQUIRED FROM 0'-6" TO 12'-6") (FLAT #16)

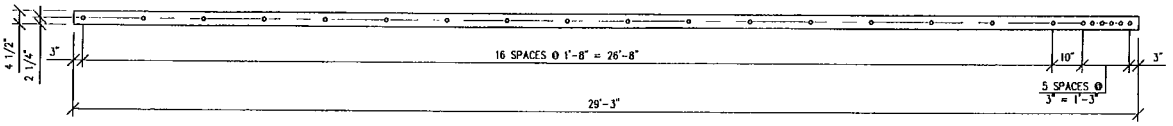

PLATE MK~SR2
(2 REQUIRED FROM 0'-6" TO 29'-9") (FLATS #2 & 8)

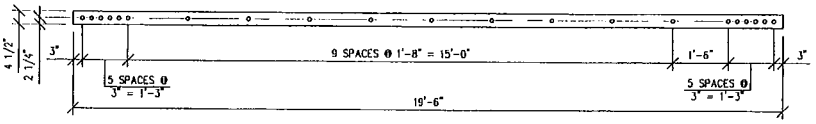

PLATE MK~SR3
(1 REQUIRED FROM 10'-3" TO 29'-9") (FLAT #14)

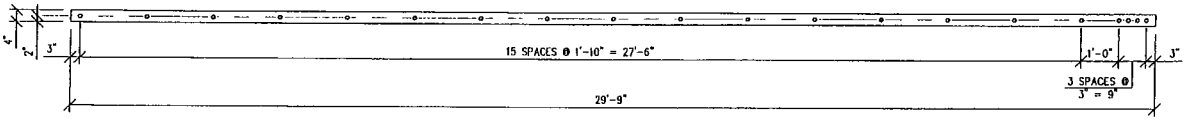

PLATE MK~SR4
(3 REQUIRED FROM 29'-10" TO 59'-7") (FLATS #2, 8 & 14)

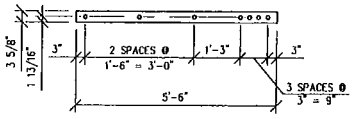

PLATE MK~SR5
(3 REQUIRED FROM 59'-8" TO 65'-2") (FLATS #2, 8 & 14)

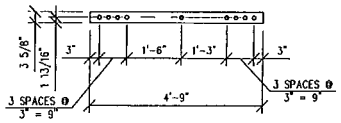

PLATE MK~SR6
(3 REQUIRED FROM 75'-9" TO 80'-6") (FLATS #2, 8 & 14)

NOTE: HOLES FOR AJAX BOLTS AND SHEAR SLEEVES ARE 31mm UNLESS NOTED OTHERWISE.

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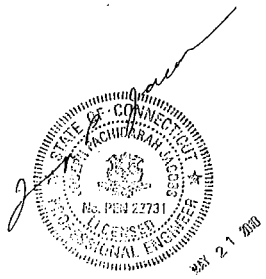

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POST MODIFICATION INSPECTION NOTES:

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

ALL PMI'S SHALL BE CONDUCTED BY AN APPROVED ENGINEERING VENDOR (AEV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN.

TO ENSURE THAT THE REQUIREMENTS OF THE PMI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE PMI 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 : POST MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

ENGINEER OF RECORD
THE EOR SHALL SUBMIT THIS PMI CHECKLIST IDENTIFYING ALL REQUIRED DOCUMENTS AND INSPECTIONS REQUIRED FOR THE ACCEPTANCE OF THE MODIFICATION INSTALLATION.

- FOR DESIGN-BID-BUILD (DBB) THE CHECKLIST SHALL BE SUBMITTED WITH THE MODIFICATION DRAWINGS.
- FOR TURNKEY PROJECTS THIS CHECKLIST SHALL BE SUBMITTED AS PART OF THE BID RESPONSE PACKAGE AND AS PART OF THE FINAL MODIFICATION DRAWING PACKAGE.

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

- REVIEW THE REQUIREMENTS OF THE PMI CHECKLIST
- BEGIN DEVELOPING A SCHEDULE TO CONDUCT ON-SITE PMI INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS

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

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

- REVIEW THE REQUIREMENTS OF THE PMI CHECKLIST
- BEGIN DEVELOPING A SCHEDULE TO CONDUCT ON-SITE PMI INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS
- BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS

THE GC SHALL COORDINATE AND CONDUCT ALL CONSTRUCTION INSPECTIONS AND REPORTS AS IDENTIFIED IN THE PMI CHECKLIST AND SUBMIT SAID INSPECTIONS AND REPORTS TO THE PMI INSPECTOR.

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

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

- THE GC AND PMI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND PMI 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 PMI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND PMI INSPECTOR ON-SITE DURING THE PMI TO HAVE ANY DEFICIENCIES CORRECTED DURING THE INITIAL PMI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE PMI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE PMI INSPECTOR IS ON SITE.

CANCELLATION OR DELAYS IN SCHEDULED PMI
IF THE GC AND PMI INSPECTOR AGREE TO A DATE ON WHICH THE PMI 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.). 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.

POST-MODIFICATION CHECKLIST

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
	PRE-CONSTRUCTION
X	PMI CHECKLIST DRAWING
X	EXHIBIT B: CROWN APPROVED A&E VENDOR AGREEMENT (REQUIRED FOR TURNKEY PROJECTS)
X	BUILDING PERMIT (AS REQUIRED)
X	EOR APPROVED SHOP DRAWINGS
X	FABRICATION INSPECTION
X	FABRICATOR WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
X	FABRICATOR NDE INSPECTION
X	CONTRACTOR NDE REPORT OF MONOPOLE BASE PLATE
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
	CONSTRUCTION
X	CONSTRUCTION INSPECTIONS
-	FOUNDATION INSPECTIONS
-	CONCRETE COMP. STRENGTH AND SLUMP TESTS
X	POST INSTALLED ANCHOR ROD EPOXY/GROUT VERIFICATION
X	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
-	EARTHWORK: LIFT AND DENSITY
X	GALVANIZING VERIFICATION
X	REDLINE CONSTRUCTION DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS:	
	POST-CONSTRUCTION
X	AS-BUILT/RECORD DRAWINGS (STAMPED)
-	FOUNDATION INSPECTIONS
X	BASE LEVEL DRAWING (COAX PLACEMENT)
X	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	CERTIFICATE OF OCCUPANCY
X	PHOTOGRAPHS
X	EXHIBIT C: CERTIFICATE OF COMPLIANCE (REQUIRED WHEN CROWN DOES NOT ISSUE A PO FOR PMI)
X	PMI REPORT
ADDITIONAL TESTING AND INSPECTIONS:	

NOTE: X DENOTES A DOCUMENT NEEDED FOR THE PMI REPORT

CORRECTION OF FAILING PMI'S
IF THE MODIFICATION INSTALLATION WOULD FAIL THE PMI ("REJECTED"), 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 PMI.
- OR, WITH CROWN'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION

ALL ASSOCIATED COST FOR CORRECTING "REJECTED" PMI'S SHALL BE BORN BY THE GC.

PAYMENT
PAYMENT OF PMI INSPECTOR

- WHEN CROWN ISSUES A PO DIRECTLY TO AN AEV FOR PMI SERVICES, FULL PAYMENT FOR THE PMI SERVICES MAY BE RELEASED WHEN A PMI REPORT ADHERES TO THE REQUIREMENTS OF THE PMI CHECKLIST AND ENG-SOW-10007 : PMI SOW. EXCEPTIONS MAY BE MADE WHEN THE PMI INSPECTOR PERFORMED DUE DILIGENCE IN REQUESTING INSPECTION AND TESTING DOCUMENTATION FROM THE GC BUT WAS UNABLE TO OBTAIN.

PAYMENT OF GENERAL CONTRACTOR

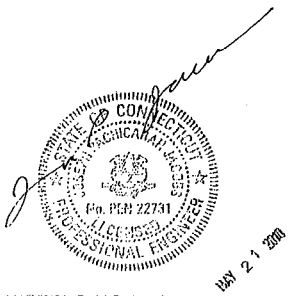
- PAYMENT FOR THE GC INSTALLATION SERVICES MAY BE RELEASED UPON RECEIPT OF A "PASSING" OR A "PASS AS NOTED" PMI REPORT AND ALL CLOSE OUT MATERIALS.

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

ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS AS CONTAINED HEREIN AND THE CONTRACT DOCUMENTS.

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

REJECTABLE INDICATIONS WILL BE RELAYED TO THE ORIGINAL PMI INSPECTOR AND THE GC. APPROPRIATE DISCIPLINARY ACTION MAY RESULT DEPENDENT UPON THE FREQUENCY AND THE LEVEL OF SEVERITY OF THE REJECTIONS.



MAY 21, 2010

ISSUE DATE FOR PRELIM: 5-20-2010

MONOPOLE REINFORCEMENT AND RETROFIT PROJECT
BU #876363; HARTFORD-NU (SSUSA); HARTFORD, CT

Revisions:

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Job No.	63710-0013
Date:	5-20-2010
Scale:	N.T.S.
Designed By:	J.J.F.
Drawn By:	B.M.S.
Checked By:	
SHEET NO:	S-10

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CLEAR

4400 Carillon Point
Kirkland, WA 98033

To: Connecticut Siting Council
From: Frantz Pierre – Radio Frequency Engineer
Cc: Cameron Syme
Subject: Power Density Report for CT-HFD0072
Date: May 28,2010

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1. Introduction:

This report is the result of Electromagnetic Field Intensities (EMF – Power Densities) study for the Clearwire broadband antenna installation on a monopole Tower at 219 New Park Avenue, Hartford, CT, 06002. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from locations surrounding the transmitting location:

2: Discussion:

The following assumptions were used in the calculations:

1) The emissions from Clearwire transmitters are in the (2496 – 2960) Frequency Band
2) The emissions from the Clearwire Microwave dishes are in the 23 GHz Frequency Band
3) The model number for Clearwire Antenna is Argus LLPX310R
4) The model number for the Microwave dish is Andrew VHLP1-23 with 12" Diameter.
5) The Clearwire Panel antenna centerline is 95 feet.
6) The Clearwire Microwave dish centerline is 95 feet.
7) The Maximum Transmit power from any Clearwire panel antenna is 251 Watts Effective Isotropic Radiated Power (EiRP) assuming 2 channels per sector.
8) The Maximum Transmit power from any Clearwire Microwave Dish is 346 Watts Effective Isotropic Radiated Power (EiRP) assuming 1 channel per dish.
9) All antennas are simultaneously transmitting and receiving 24 hours per day.
10) The average ground level of the studied area does not change significantly with respect to the transmitting location.

Equations given in "FCC OET Bulletin 65, Edition 97-01" were used with the above information to perform the calculations.

3: Conclusion:

Based on the above worst case assumptions, the power density calculation from the Clearwire antenna installation on a Monopole Tower at 219 New Park Ave., Hartford, CT is 0.0002278 mW/cm^2. This value represents 0.0035% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter (mW/cm^2) set forth in the FCC/ANSI/IEEE C95-1-1991. Furthermore, the proposed antenna location for Clearwire will not interfere with existing public safety communications, AM or FM radio broadcasts, TV, Police Communications, HAM Radio communications or any other signals in the area.

The combined Power Density from all other carriers is 11.3056 %. The combined Power Density for this site is 11.3091% of the M.P.E. standard.