Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts

October 29, 2015

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

Re: **EM-VER-032-140221 – 400 Reily Mountain Road, Coventry, Connecticut**
EM-VER-082-140221 – 484 Meriden Road, Middlefield, Connecticut
EM-VER-116-140221 – 165 Elmwood Hill Road, Putnam, Connecticut
EM-VER-097-140224 – 201 South Main Street, Newtown, Connecticut
EM-VER-006-140307 – 664 Rimmon Hill Road, Beacon Falls, Connecticut
EM-VER-117-140320 – 100 Old Redding Road, Redding, Connecticut
EM-VER-161-140224 – 128 Mather Street, Wilton, Connecticut
EM-VER-032-140221 – 14 Canton Spring Road, Canton, Connecticut
EM-VER-108-140303 – 691 Oxford Road, Oxford, Connecticut
EM-VER-017-140325 – 32 Valley Street, Bristol, Connecticut
EM-VER-119-140325 – 2 West Street, Rocky Hill, Connecticut
EM-VER-165-140325 – 55 King Spring Road, Windsor Locks, Connecticut
EM-VER-027-140423 – 48 Cow Hill Road, Clinton, Connecticut
EM-VER-141-140505 – 347 Riverside Drive, Thompson, Connecticut*

Completion of Construction Activity

Dear Ms. Bachman:

The purpose of this letter is to notify the Siting Council that the facility modifications approved in each of the above-referenced filings have not yet been completed. Several of these facility modifications are being re-designed and others have been placed, temporarily, "on hold" until 2016. Once these projects are ready to move forward, Verizon Wireless will file new notices of exempt modification for each facility. As such, we will not be submitting post construction completion notification letters for any of the referenced sites.

14232765-v1

* Please note that the redesigned facility modification at 347 Riverside Drive, Thompson was submitted to the Council and recently approved.

If you have any questions or need any additional information regarding these facilities please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Copy to:
Tim Parks

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

March 17, 2014

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103

RE: **EM-VER-097-140224** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 201 South Main Street, Newtown, Connecticut.

Dear Attorney Baldwin:

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

- Prior to antenna installation, the reinforcements specified in Section 4.1 of the Structural Analysis Report dated January 15, 2014 and prepared by Paul J. Ford and Company and shall be implemented per modification drawings prepared by Paul J. Ford and Company dated August 20, 2013;
- Within 45 days following completion of the antenna installation, Cellco shall provide documentation certified by a professional engineer that its installation complied with the requirements of the structural analysis;
- Any deviation from the proposed modification as specified in this notice and supporting materials with the Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration.

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated February 21, 2014 and additional information received on March 10, 2014. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Very truly yours,

Melanie A. Bachman
Acting Executive Director

MAB/MP/jb

c: The Honorable Patricia E. Llodra, First Selectman, Town of Newtown
Gary Frenette, Zoning Enforcement Officer, Town of Newtown
Crown Castle

Perrone, Michael

From: Mayo, Rachel <rmayo@RC.com>
Sent: Monday, March 10, 2014 1:21 PM
To: Perrone, Michael
Cc: Baldwin, Kenneth; Mayo, Rachel
Subject: RE: EM Questions
Attachments: 3963744.pdf

Mike, as requested, here is the structural w/ mod design dated 8/20/13 for your files re: 201 main st, newtown

---

From: Perrone, Michael [mailto:Michael.Perrone@ct.gov]
Sent: Thursday, March 06, 2014 2:51 PM
To: Mayo, Rachel
Cc: Baldwin, Kenneth
Subject: RE: EM Questions

Thank you for the responses. I'm all set.

Mike

From: Mayo, Rachel [mailto:rmayo@RC.com]
Sent: Thursday, March 06, 2014 2:24 PM
To: Perrone, Michael
Cc: Baldwin, Kenneth; Mayo, Rachel
Subject: FW: EM Questions

Hi mike, ken forwarded me your email...see below for responses

---

From: Perrone, Michael [mailto:Michael.Perrone@ct.gov]
Sent: Wednesday, March 05, 2014 3:37 PM
To: Baldwin, Kenneth
Subject: EM Questions

I just have a few minor questions about some EMs.

EM-VER-097-140224 – 201 South Main Street, Newtown – Section 4.1 of the structural analysis references modification drawings by Paul J. Ford Company dated 8/20/2013. They aren't attached to the structural analysis report. Could we get a copy of those modification drawings for our file? Then we'll have a record of the actual required modifications. I HAVE ASKED VERIZON TO REQUEST A COPY OF THESE DRAWINGS FROM THE TOWER COMPANY..WE WILL FORWARD THEM AS SOON AS WE GET THEM

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

Date: **August 20, 2013**

Steve Tuttle
Crown Castle USA Inc.
8 Parkmeadow Drive
Pittsford, NY 14534
(585) 899-3445

Paul J. Ford and Company
250 East Broad Street, Suite 600
Columbus, Ohio 43215
(614) 221-6679
kthorpe@pjfweb.com

Subject: **Structural Analysis Report**

Carrier Designation:	***Sprint PCS* Co-Locate – Final Loading**	
	Carrier Site Number:	CT54XC716
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	826222
	Crown Castle Site Name:	Newtown/RT-25
	Crown Castle JDE Job Number:	225018
	Crown Castle Work Order Number:	600035
	Crown Castle Application Number:	180205 Rev. 3
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37513-1642 BP
Site Data:	**201 Main Street, Newtown, Fairfield County, CT**	
	Latitude *41° 22' 41.322"*, Longitude *-73° 16' 26.843"*	
	150 Foot - Monopole Tower	

Dear Steve Tuttle,

Paul J. Ford and Company is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 557263, in accordance with application 180205, revision 3.

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

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

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

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

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

Respectfully submitted by:

Kyle Thorpe, E.I.
Structural Designer

tnxTower Report - version 6.0.4.0

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

AUG 2 1 2013

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

Date: **August 20, 2013**

Steve Tuttle
Crown Castle USA Inc.
8 Parkmeadow Drive
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Respectfully submitted by:

Kyle Thorpe, E.I.
Structural Designer

tnxTower Report - version 6.0.4.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 150 ft Monopole tower designed by PIROD MANUFACTURES INC. in October of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

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

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
140.0	137.0	3	alcatel lucent	1900MHz RRH	3 (E)	1-1/4	1
		3	alcatel lucent	800MHZ RRH			
		6	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			

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

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
148.0	150.0	1	andrew	HP4-102	13 (I) 12 (E)	1-5/8 1-5/8	1
	148.0	6	andrew	ETW190VS12UB			
		12	andrew	TMBXX-6516-R2M w/ Mount Pipe			
		1	tower mounts	Sector Mount [SM 411-3]			
140.0	140.0	6	decibel	DB980F90E-M w/ Mount Pipe	9 (I)	1-5/8	2
		3	decibel	DB980F90T2E-M w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 712-1]	-	-	1
127.0	127.0	1	antel	BXA-171063-12BF w/ Mount Pipe	12 (I)	1-5/8	1
		2	antel	BXA-171063/8CF w/ Mount Pipe			
		6	rfs celwave	APL866513-42T0 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		3	swedcom	SLCP 2x6014 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 304-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
110.0	110.0	6	ericsson	RRUS-11	1 (I) 2 (I) 12 (I)	1/4 7/8 1-1/4	1
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		3	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 303-1]			

Notes:
1) Existing Equipment
2) Equipment To Be Removed within 6 months, NOT considered in this analysis
(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.

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 1305751600, 08/15/2013	3536527	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Pirod, A-117711-F-1001206, 10/17/2000	3536528	CCISITES

3.1) Analysis Method

tnxTower (version 6.0.4.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) For proposed modifications: monopole will be reinforced in conformance with the attached proposed modification drawings, dated 8/16/2013.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	150 - 133	Pole	TP26x21.83x0.25	1	-4.23	1032.38	15.3	Pass
L2	133 - 98.45	Pole	TP34.0625x24.7764x0.3125	2	-12.14	1691.15	53.7	Pass
L3	98.45 - 64.8	Pole	TP41.75x32.4841x0.375	3	-19.02	2488.32	66.2	Pass
L4	64.8 - 32	Pole	TP49.0625x39.8387x0.375	4	-27.21	2928.95	77.1	Pass
L5	32 - 0	Pole	TP56.125x46.9597x0.375	5	-38.28	3394.28	84.9	Pass
							Summary	
						Pole (L5)	84.9	Pass
						Rating =	84.9	Pass

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

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	80.1	Pass
1	Base Plate	0	Pass	Pass
1	Base Foundation Structural Steel	0	95.9	Pass
1	Base Foundation Soil Interaction	0	84.2	Pass

Structure Rating (max from all components) =	95.9%

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

4.1) Recommendations

Reinforce the monopole in conformance with the attached proposed modification drawings, dated 8/20/2013.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

Tower is located in Fairfield County, Connecticut.
Basic wind speed of 85.00 mph.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56.00 pcf.
A wind speed of 37.60 mph is used in combination with ice.
Deflections calculated using a wind speed of 50.00 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	150.0000-133.0000	17.0000	2.95	18	21.8300	26.0000	0.2500	1.0000	A572-65 (65 ksi)
L2	133.0000-98.4500	37.5000	3.85	18	24.7764	34.0625	0.3125	0.1250	A572-65 (65 ksi)
L3	98.4500-64.8000	37.5000	4.70	18	32.4841	41.7500	0.3750	1.5000	A572-65 (65 ksi)
L4	64.8000-32.0000	37.5000	5.50	18	39.8387	49.0625	0.3750	0.1875	A572-65 (65 ksi)
L5	32.0000-0.0000	37.5000		18	46.9597	56.1250	0.3750	0.1875	A572-65 (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	22.1668	17.1237	1007.4853	7.6609	11.0896	90.8492	2016.2962	8.5635	3.4021	13.608
	26.4011	20.4326	1711.6544	9.1412	13.2080	129.5922	3425.5610	10.2183	4.1360	16.544
L2	25.9004	24.2651	1834.7231	8.6847	12.5864	145.7703	3671.8604	12.1349	4.2066	13.461
	34.5880	33.4758	4817.4335	11.9812	17.3038	278.4040	9641.2058	16.7411	5.8410	18.691
L3	33.9512	38.2179	4978.0707	11.3987	16.5019	301.6659	9962.6917	19.1126	5.0572	13.486
	42.3941	49.2466	10650.9822	14.6881	21.2090	502.1916	21315.9793	24.6280	6.6880	17.835
L4	41.6271	46.9716	9242.0494	14.0096	20.2380	456.6670	18496.2597	23.4903	6.8136	18.17
	49.8194	57.9503	17355.1378	17.2841	24.9238	696.3293	34733.1119	28.9807	8.4370	22.499
L5	49.0491	55.4474	15202.1420	16.5376	23.8555	637.2590	30424.2873	27.7290	8.0669	21.512
	56.9908	66.3564	26056.1506	19.7913	28.5115	913.8821	52146.5865	33.1845	9.6800	25.813

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 150.0000-133.0000				1	1	1		
L2 133.0000-98.4500				1	1	1		
L3 98.4500-64.8000				1	1	1		
L4 64.8000-32.0000				1	1	1		
L5 32.0000-0.0000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
**********										

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
LDF7-50A(1-5/8")	C	No	Inside Pole	148.0000 - 0.0000	25	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
***								
HB114-1-0813U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	140.0000 - 0.0000	2	No Ice	0.0000	1.20
						1/2" Ice	0.0000	2.45
						1" Ice	0.0000	4.30
						2" Ice	0.0000	9.85
						4" Ice	0.0000	28.27
HB114-1-0813U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	140.0000 - 0.0000	1	No Ice	0.1540	1.20
						1/2" Ice	0.2540	2.45
						1" Ice	0.3540	4.30
						2" Ice	0.5540	9.85
						4" Ice	0.9540	28.27
***								

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	10	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	2	No Ice	0.1980	0.82
						1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
						2" Ice	0.5980	10.54
						4" Ice	0.9980	30.04
***								
LDF5-50A(7/8")	C	No	Inside Pole	110.0000 - 0.0000	2	No Ice	0.0000	0.33
						1/2" Ice	0.0000	0.33
						1" Ice	0.0000	0.33
						2" Ice	0.0000	0.33
						4" Ice	0.0000	0.33
LDF6-50A(1-1/4")	C	No	Inside Pole	110.0000 - 0.0000	12	No Ice	0.0000	0.66
						1/2" Ice	0.0000	0.66
						1" Ice	0.0000	0.66
						2" Ice	0.0000	0.66
						4" Ice	0.0000	0.66
9776(3/4")	C	No	Inside Pole	110.0000 - 0.0000	1	No Ice	0.0000	0.31
						1/2" Ice	0.0000	0.31
						1" Ice	0.0000	0.31
						2" Ice	0.0000	0.31
						4" Ice	0.0000	0.31
**********								

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(4) TMBXX-6516-R2M w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	148.0000	No Ice	6.1758	4.5251	0.05
						1/2" Ice	6.6547	5.2050	0.10
						1" Ice	7.1374	5.8987	0.16
						2" Ice	8.1341	7.3732	0.29
						4" Ice	10.2560	10.5560	0.67
(4) TMBXX-6516-R2M w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	148.0000	No Ice	6.1758	4.5251	0.05
						1/2" Ice	6.6547	5.2050	0.10
						1" Ice	7.1374	5.8987	0.16
						2" Ice	8.1341	7.3732	0.29
						4" Ice	10.2560	10.5560	0.67
(4) TMBXX-6516-R2M w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	148.0000	No Ice	6.1758	4.5251	0.05
						1/2" Ice	6.6547	5.2050	0.10
						1" Ice	7.1374	5.8987	0.16
						2" Ice	8.1341	7.3732	0.29
						4" Ice	10.2560	10.5560	0.67
(2) ETW190VS12UB	A	From Face	4.0000 0.00 0.00	0.0000	148.0000	No Ice	0.6644	0.3669	0.01
						1/2" Ice	0.7783	0.4613	0.02
						1" Ice	0.9008	0.5644	0.03
						2" Ice	1.1717	0.7964	0.04
						4" Ice	1.8173	1.3642	0.11
(2) ETW190VS12UB	B	From Face	4.0000 0.00 0.00	0.0000	148.0000	No Ice	0.6644	0.3669	0.01
						1/2" Ice	0.7783	0.4613	0.02
						1" Ice	0.9008	0.5644	0.03
						2" Ice	1.1717	0.7964	0.04
						4" Ice	1.8173	1.3642	0.11

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
						4" Ice			
(2) ETW190VS12UB	C	From Face	4.0000 0.00 0.00	0.0000	148.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.6644 0.7783 0.9008 1.1717 1.8173	0.3669 0.4613 0.5644 0.7964 1.3642	0.01 0.02 0.03 0.04 0.11
Sector Mount [SM 411-3]	C	None		0.0000	148.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	21.8800 30.6800 39.4800 57.0800 92.2800	21.8800 30.6800 39.4800 57.0800 92.2800	1.07 1.48 1.90 2.73 4.40
***									
(2) APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.0000 0.00 -3.00	0.0000	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.22 0.41 0.91
(2) APXVSPP18-C-A20 w/ Mount Pipe	B	From Face	4.0000 0.00 -3.00	0.0000	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.22 0.41 0.91
(2) APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.0000 0.00 -3.00	0.0000	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.22 0.41 0.91
1900MHz RRH	A	From Face	4.0000 0.00 -3.00	0.0000	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.9069 3.1446 3.3909 3.9094 5.0502	3.8014 4.0650 4.3372 4.9076 6.1520	0.04 0.08 0.11 0.19 0.41
1900MHz RRH	B	From Face	4.0000 0.00 -3.00	0.0000	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.9069 3.1446 3.3909 3.9094 5.0502	3.8014 4.0650 4.3372 4.9076 6.1520	0.04 0.08 0.11 0.19 0.41
1900MHz RRH	C	From Face	4.0000 0.00 -3.00	0.0000	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.9069 3.1446 3.3909 3.9094 5.0502	3.8014 4.0650 4.3372 4.9076 6.1520	0.04 0.08 0.11 0.19 0.41
800MHZ RRH	A	From Face	4.0000 0.00 -3.00	0.0000	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.4899 2.7061 2.9310 3.4068 4.4620	2.0685 2.2705 2.4812 2.9284 3.9265	0.05 0.07 0.10 0.16 0.32
800MHZ RRH	B	From Face	4.0000 0.00 -3.00	0.0000	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.4899 2.7061 2.9310 3.4068 4.4620	2.0685 2.2705 2.4812 2.9284 3.9265	0.05 0.07 0.10 0.16 0.32
800MHZ RRH	C	From Face	4.0000 0.00 -3.00	0.0000	140.0000	No Ice 1/2" Ice	2.4899 2.7061 2.9310	2.0685 2.2705 2.4812	0.05 0.07 0.10

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
						1" Ice	3.4068	2.9284	0.16
						2" Ice	4.4620	3.9265	0.32
						4" Ice			
Platform Mount [LP 712-1]	C	None		0.0000	140.0000	No Ice	24.5300	24.5300	1.34
						1/2" Ice	29.9400	29.9400	1.65
						1" Ice	35.3500	35.3500	1.96
						2" Ice	46.1700	46.1700	2.58
						4" Ice	67.8100	67.8100	3.82
***									
(2) BXA-171063/8CF w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1574 3.5312 3.9415 4.8273 6.7342	3.3303 3.9423 4.5633 5.8553 8.8407	0.03 0.06 0.10 0.19 0.48
(2) APL866513-42T0 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.5308 4.9675 5.4135 6.3370 8.3197	4.9208 5.5962 6.2837 7.7123 10.8330	0.03 0.08 0.13 0.25 0.60
(2) SLCP 2x6014 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.4514 7.9606 8.4698 9.5191 11.7421	6.9545 7.7563 8.5195 10.0997 13.4750	0.04 0.10 0.18 0.34 0.80
(2) APL866513-42T0 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.5308 4.9675 5.4135 6.3370 8.3197	4.9208 5.5962 6.2837 7.7123 10.8330	0.03 0.08 0.13 0.25 0.60
SLCP 2x6014 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.4514 7.9606 8.4698 9.5191 11.7421	6.9545 7.7563 8.5195 10.0997 13.4750	0.04 0.10 0.18 0.34 0.80
(2) APL866513-42T0 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.5308 4.9675 5.4135 6.3370 8.3197	4.9208 5.5962 6.2837 7.7123 10.8330	0.03 0.08 0.13 0.25 0.60
BXA-171063-12BF w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.9710 5.5211 6.0361 7.0911 9.3593	5.2283 6.3892 7.2610 9.0462 12.8165	0.04 0.08 0.14 0.27 0.67
(2) FD9R6004/2C-3L	A	From Face	4.0000 0.00 0.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2809	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	B	From Face	4.0000 0.00 0.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2809	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	C	From Face	4.0000	0.0000	127.0000	No Ice	0.3665	0.0846	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				1/2" Ice	0.4506	0.1362	0.01
			0.00				1" Ice	0.5433	0.1965	0.01
							2" Ice	0.7546	0.3430	0.02
							4" Ice	1.2809	0.7396	0.06
Platform Mount [LP 304-1]	C	None			0.0000	127.0000	No Ice	17.4600	17.4600	1.35
							1/2" Ice	22.4400	22.4400	1.62
							1" Ice	27.4200	27.4200	1.90
							2" Ice	37.3800	37.3800	2.45
							4" Ice	57.3000	57.3000	3.55
***										
7770.00 w/ Mount Pipe	A	From Face	4.0000		0.0000	110.0000	No Ice	6.1194	4.2543	0.06
			0.00				1/2" Ice	6.6258	5.0137	0.10
			0.00				1" Ice	7.1283	5.7109	0.16
							2" Ice	8.1643	7.1553	0.29
							4" Ice	10.3599	10.4117	0.66
7770.00 w/ Mount Pipe	B	From Face	4.0000		0.0000	110.0000	No Ice	6.1194	4.2543	0.06
			0.00				1/2" Ice	6.6258	5.0137	0.10
			0.00				1" Ice	7.1283	5.7109	0.16
							2" Ice	8.1643	7.1553	0.29
							4" Ice	10.3599	10.4117	0.66
7770.00 w/ Mount Pipe	C	From Face	4.0000		0.0000	110.0000	No Ice	6.1194	4.2543	0.06
			0.00				1/2" Ice	6.6258	5.0137	0.10
			0.00				1" Ice	7.1283	5.7109	0.16
							2" Ice	8.1643	7.1553	0.29
							4" Ice	10.3599	10.4117	0.66
(2) LGP21401	A	From Face	4.0000		0.0000	110.0000	No Ice	1.2880	0.2326	0.01
			0.00				1/2" Ice	1.4453	0.3134	0.02
			0.00				1" Ice	1.6112	0.4028	0.03
							2" Ice	1.9690	0.6076	0.05
							4" Ice	2.7883	1.1209	0.14
(2) LGP21401	B	From Face	4.0000		0.0000	110.0000	No Ice	1.2880	0.2326	0.01
			0.00				1/2" Ice	1.4453	0.3134	0.02
			0.00				1" Ice	1.6112	0.4028	0.03
							2" Ice	1.9690	0.6076	0.05
							4" Ice	2.7883	1.1209	0.14
(2) LGP21401	C	From Face	4.0000		0.0000	110.0000	No Ice	1.2880	0.2326	0.01
			0.00				1/2" Ice	1.4453	0.3134	0.02
			0.00				1" Ice	1.6112	0.4028	0.03
							2" Ice	1.9690	0.6076	0.05
							4" Ice	2.7883	1.1209	0.14
P65-16-XLH-RR w/ Mount Pipe	A	From Face	4.0000		0.0000	110.0000	No Ice	8.6375	6.3625	0.08
			0.00				1/2" Ice	9.2903	7.5378	0.14
			0.00				1" Ice	9.9098	8.4270	0.22
							2" Ice	11.1763	10.2390	0.39
							4" Ice	13.8289	14.0988	0.89
P65-16-XLH-RR w/ Mount Pipe	B	From Face	4.0000		0.0000	110.0000	No Ice	8.6375	6.3625	0.08
			0.00				1/2" Ice	9.2903	7.5378	0.14
			0.00				1" Ice	9.9098	8.4270	0.22
							2" Ice	11.1763	10.2390	0.39
							4" Ice	13.8289	14.0988	0.89
P65-16-XLH-RR w/ Mount Pipe	C	From Face	4.0000		0.0000	110.0000	No Ice	8.6375	6.3625	0.08
			0.00				1/2" Ice	9.2903	7.5378	0.14
			0.00				1" Ice	9.9098	8.4270	0.22
							2" Ice	11.1763	10.2390	0.39
							4" Ice	13.8289	14.0988	0.89

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
(2) RRUS-11	A	From Face	4.0000	0.0000	110.0000	No Ice	3.2486	1.3726	0.05
			0.00			1/2" Ice	3.4905	1.5510	0.07
			0.00			1" Ice	3.7411	1.7380	0.09
						2" Ice	4.2682	2.1381	0.15
						4" Ice	5.4260	3.0418	0.31
(2) RRUS-11	B	From Face	4.0000	0.0000	110.0000	No Ice	3.2486	1.3726	0.05
			0.00			1/2" Ice	3.4905	1.5510	0.07
			0.00			1" Ice	3.7411	1.7380	0.09
						2" Ice	4.2682	2.1381	0.15
						4" Ice	5.4260	3.0418	0.31
(2) RRUS-11	C	From Face	4.0000	0.0000	110.0000	No Ice	3.2486	1.3726	0.05
			0.00			1/2" Ice	3.4905	1.5510	0.07
			0.00			1" Ice	3.7411	1.7380	0.09
						2" Ice	4.2682	2.1381	0.15
						4" Ice	5.4260	3.0418	0.31
DC6-48-60-18-8F	A	From Face	4.0000	0.0000	110.0000	No Ice	2.5667	2.5667	0.02
			0.00			1/2" Ice	2.7978	2.7978	0.04
			0.00			1" Ice	3.0377	3.0377	0.07
						2" Ice	3.5432	3.5432	0.13
						4" Ice	4.6580	4.6580	0.30
Platform Mount [LP 303-1]	C	None		0.0000	110.0000	No Ice	14.6600	14.6600	1.25
						1/2" Ice	18.8700	18.8700	1.48
						1" Ice	23.0800	23.0800	1.71
						2" Ice	31.5000	31.5000	2.18
						4" Ice	48.3400	48.3400	3.10
**********									
**									

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
HP4-102	C	Paraboloid w/Shroud (HP)	From Face	4.0000	0.0000		148.0000	4.0000	No Ice	12.5700	0.08
				0.00					1/2" Ice	13.1000	0.15
				2.00					1" Ice	13.6200	0.21
									2" Ice	14.6800	0.35
									4" Ice	16.8000	0.62
**********											
*											

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-133.0000	141.2530	1.515	28.02	33.880	A	0.000	33.880	33.880	100.00	0.000	0.000
					B	0.000	33.880		100.00	0.000	0.000
					C	0.000	33.880		100.00	0.000	1.078
L2 133.0000-98.4500	115.0815	1.429	26.40	85.755	A	0.000	85.755	85.755	100.00	0.000	0.000
					B	0.000	85.755		100.00	0.000	0.000
					C	0.000	85.755		100.00	0.000	16.626
L3 98.4500-64.8000	81.2529	1.294	23.88	105.416	A	0.000	105.416	105.416	100.00	0.000	0.000
					B	0.000	105.416		100.00	0.000	0.000
					C	0.000	105.416		100.00	0.000	18.507
L4 64.8000-32.0000	48.3113	1.115	20.51	123.078	A	0.000	123.078	123.078	100.00	0.000	0.000
					B	0.000	123.078		100.00	0.000	0.000
					C	0.000	123.078		100.00	0.000	18.040
L5 32.0000-0.0000	15.6006	1	18.50	139.239	A	0.000	139.239	139.239	100.00	0.000	0.000
					B	0.000	139.239		100.00	0.000	0.000
					C	0.000	139.239		100.00	0.000	17.600

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-133.0000	141.2530	1.515	5.48	0.8930	36.410	A	0.000	36.410	36.410	100.00	0.000	0.000
						B	0.000	36.410		100.00	0.000	0.000
						C	0.000	36.410		100.00	0.000	2.328
L2 133.0000-98.4500	115.0815	1.429	5.17	0.8713	90.897	A	0.000	90.897	90.897	100.00	0.000	0.000
						B	0.000	90.897		100.00	0.000	0.000
						C	0.000	90.897		100.00	0.000	32.995
L3 98.4500-64.8000	81.2529	1.294	4.67	0.8356	110.303	A	0.000	110.303	110.303	100.00	0.000	0.000
						B	0.000	110.303		100.00	0.000	0.000
						C	0.000	110.303		100.00	0.000	36.099
L4 64.8000-32.0000	48.3113	1.115	4.01	0.7851	127.646	A	0.000	127.646	127.646	100.00	0.000	0.000
						B	0.000	127.646		100.00	0.000	0.000
						C	0.000	127.646		100.00	0.000	34.486
L5 32.0000-0.0000	15.6006	1	3.62	0.7500	143.426	A	0.000	143.426	143.426	100.00	0.000	0.000
						B	0.000	143.426		100.00	0.000	0.000
						C	0.000	143.426		100.00	0.000	32.674

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-133.0000	141.2530	1.515	9.70	33.880	A	0.000	33.880	33.880	100.00	0.000	0.000
					B	0.000	33.880		100.00	0.000	0.000
					C	0.000	33.880		100.00	0.000	1.078
L2 133.0000-98.4500	115.0815	1.429	9.14	85.755	A	0.000	85.755	85.755	100.00	0.000	0.000
					B	0.000	85.755		100.00	0.000	0.000
					C	0.000	85.755		100.00	0.000	16.626
L3 98.4500-64.8000	81.2529	1.294	8.26	105.416	A	0.000	105.416	105.416	100.00	0.000	0.000
					B	0.000	105.416		100.00	0.000	0.000
					C	0.000	105.416		100.00	0.000	18.507
L4 64.8000-32.0000	48.3113	1.115	7.10	123.078	A	0.000	123.078	123.078	100.00	0.000	0.000
					B	0.000	123.078		100.00	0.000	0.000
					C	0.000	123.078		100.00	0.000	18.040

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
L5 32.0000-0.0000	15.6006	1	6.40	139.239	A	0.000	139.239	139.239	100.00	0.000	0.000
					B	0.000	139.239		100.00	0.000	0.000
					C	0.000	139.239		100.00	0.000	17.600

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 133	28.859	27	1.6160	0.0090
L2	135.95 - 98.45	24.130	27	1.5869	0.0061
L3	102.3 - 64.8	13.845	27	1.2748	0.0027
L4	69.5 - 32	6.393	27	0.8671	0.0013
L5	37.5 - 0	1.878	27	0.4556	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.0000	HP4-102	27	28.859	1.6160	0.0091	33522
148.0000	(4) TMBXX-6516-R2M w/ Mount Pipe	27	28.182	1.6139	0.0086	33522
140.0000	(2) APXVSPP18-C-A20 w/ Mount Pipe	27	25.482	1.6004	0.0068	16764
127.0000	(2) BXA-171063/8CF w/ Mount Pipe	27	21.206	1.5334	0.0047	8301
110.0000	7770.00 w/ Mount Pipe	27	16.000	1.3658	0.0031	5236

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 133	83.349	2	4.6723	0.0258
L2	135.95 - 98.45	69.693	2	4.5860	0.0172
L3	102.3 - 64.8	39.996	2	3.6833	0.0076
L4	69.5 - 32	18.475	2	2.5058	0.0038
L5	37.5 - 0	5.429	2	1.3168	0.0016

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.0000	HP4-102	2	83.349	4.6723	0.0259	11715
148.0000	(4) TMBXX-6516-R2M w/ Mount Pipe	2	81.392	4.6659	0.0246	11715
140.0000	(2) APXVSPP18-C-A20 w/ Mount Pipe	2	73.595	4.6256	0.0195	5857
127.0000	(2) BXA-171063/8CF w/ Mount Pipe	2	61.249	4.4307	0.0133	2892
110.0000	7770.00 w/ Mount Pipe	2	46.218	3.9462	0.0088	1827

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	150 - 133 (1)	TP26x21.83x0.25	17.0000	0.0000	0.0	39.000	19.8584	-4.23	774.48	0.005
L2	133 - 98.45 (2)	TP34.0625x24.7764x0.3125	37.5000	0.0000	0.0	39.000	32.5302	-12.14	1268.68	0.010
L3	98.45 - 64.8 (3)	TP41.75x32.4841x0.375	37.5000	0.0000	0.0	39.000	47.8643	-19.02	1866.71	0.010
L4	64.8 - 32 (4)	TP49.0625x39.8387x0.375	37.5000	0.0000	0.0	39.000	56.3401	-27.21	2197.26	0.012
L5	32 - 0 (5)	TP56.125x46.9597x0.375	37.5000	0.0000	0.0	38.374	66.3564	-38.28	2546.35	0.015

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	150 - 133 (1)	TP26x21.83x0.25	78.64	7.711	39.000	0.198	0.00	0.000	39.000	0.000
L2	133 - 98.45 (2)	TP34.0625x24.7764x0.3125	602.50	27.509	39.000	0.705	0.00	0.000	39.000	0.000
L3	98.45 - 64.8 (3)	TP41.75x32.4841x0.375	1342.88	33.977	39.000	0.871	0.00	0.000	39.000	0.000
L4	64.8 - 32 (4)	TP49.0625x39.8387x0.375	2171.22	39.595	39.000	1.015	0.00	0.000	39.000	0.000
L5	32 - 0 (5)	TP56.125x46.9597x0.375	3261.45	42.825	38.374	1.116	0.00	0.000	38.374	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	150 - 133 (1)	TP26x21.83x0.25	10.43	0.525	26.000	0.040	0.01	0.000	26.000	0.000
L2	133 - 98.45 (2)	TP34.0625x24.7764x0.3125	20.87	0.641	26.000	0.049	0.83	0.018	26.000	0.001
L3	98.45 - 64.8 (3)	TP41.75x32.4841x0.375	24.29	0.508	26.000	0.039	0.66	0.008	26.000	0.000
L4	64.8 - 32 (4)	TP49.0625x39.8387x0.375	27.41	0.487	26.000	0.037	0.49	0.004	26.000	0.000
L5	32 - 0 (5)	TP56.125x46.9597x0.375	30.74	0.463	26.000	0.036	0.28	0.002	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 133 (1)	0.005	0.198	0.000	0.040	0.000	0.204 ✔	1.333	H1-3+VT ✔

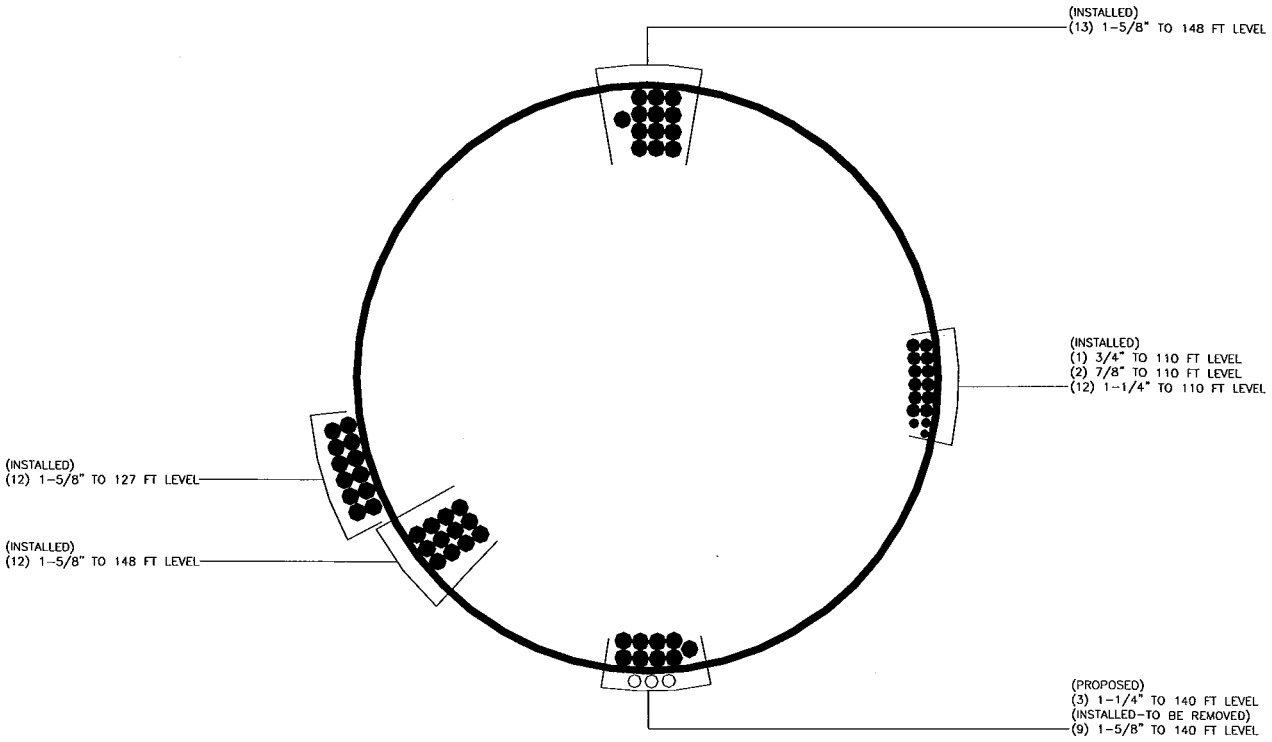
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L2	133 - 98.45 (2)	0.010	0.705	0.000	0.049	0.001	0.716 ✔	1.333	H1-3+VT ✔
L3	98.45 - 64.8 (3)	0.010	0.871	0.000	0.039	0.000	0.882 ✔	1.333	H1-3+VT ✔
L4	64.8 - 32 (4)	0.012	1.015	0.000	0.037	0.000	1.028 ✔	1.333	H1-3+VT ✔
L5	32 - 0 (5)	0.015	1.116	0.000	0.036	0.000	1.131 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	150 - 133	Pole	TP26x21.83x0.25	1	-4.23	1032.38	15.3	Pass
L2	133 - 98.45	Pole	TP34.0625x24.7764x0.3125	2	-12.14	1691.15	53.7	Pass
L3	98.45 - 64.8	Pole	TP41.75x32.4841x0.375	3	-19.02	2488.32	66.2	Pass
L4	64.8 - 32	Pole	TP49.0625x39.8387x0.375	4	-27.21	2928.95	77.1	Pass
L5	32 - 0	Pole	TP56.125x46.9597x0.375	5	-38.28	3394.28	84.9	Pass
							Summary	
						Pole (L5)	84.9	Pass
						RATING =	**84.9**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

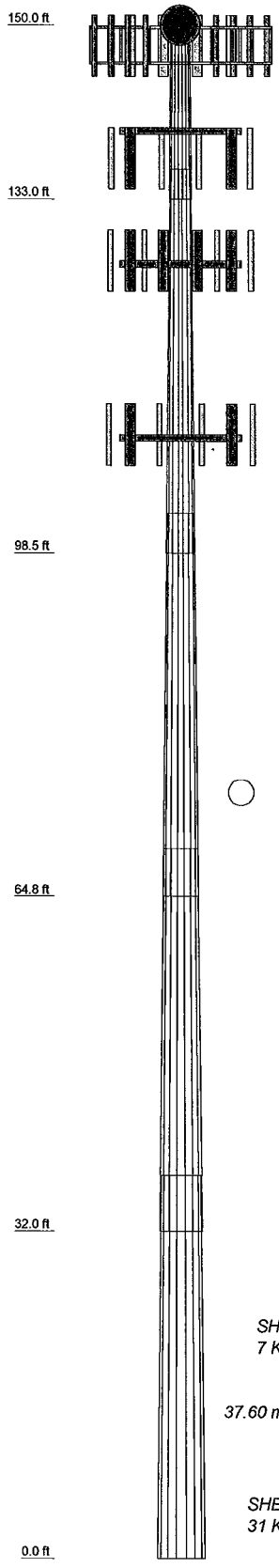


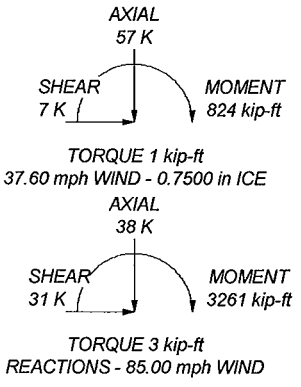
APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5
Length (ft)	17.0000	37.5000	37.5000	37.5000	37.5000
Number of Sides	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.3750	0.3750
Socket Length (ft)	2.9500	3.8500	4.7000	5.5000	
Top Dia (in)	21.8300	24.7764	32.4841	39.8387	46.9597
Bot Dia (in)	26.0000	34.0625	41.7500	49.0625	56.1250
Grade			A572-65		
Weight (K)	1.1	3.7	5.6	6.7	7.8

24.8





TORQUE 1 kip-ft
37.60 mph WIND - 0.7500 in ICE

TORQUE 3 kip-ft
REACTIONS - 85.00 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(4) TMBXX-6516-R2M w/ Mount Pipe	148	(2) APL866513-42T0 w/ Mount Pipe	127
(4) TMBXX-6516-R2M w/ Mount Pipe	148	BXA-171063-12BF w/ Mount Pipe	127
(4) TMBXX-6516-R2M w/ Mount Pipe	148	(2) FD9R6004/2C-3L	127
(2) ETW190VS12UB	148	(2) FD9R6004/2C-3L	127
(2) ETW190VS12UB	148	(2) FD9R6004/2C-3L	127
(2) ETW190VS12UB	148	Platform Mount [LP 304-1]	127
Sector Mount [SM 411-3]	148	(2) BXA-171063/8CF w/ Mount Pipe	127
HP4-102	148	7770.00 w/ Mount Pipe	110
(2) APXVSPP18-C-A20 w/ Mount Pipe	140	7770.00 w/ Mount Pipe	110
(2) APXVSPP18-C-A20 w/ Mount Pipe	140	(2) LGP21401	110
1900MHz RRH	140	(2) LGP21401	110
1900MHz RRH	140	(2) LGP21401	110
1900MHz RRH	140	P65-16-XLH-RR w/ Mount Pipe	110
800MHZ RRH	140	P65-16-XLH-RR w/ Mount Pipe	110
800MHZ RRH	140	P65-16-XLH-RR w/ Mount Pipe	110
800MHZ RRH	140	(2) RRUS-11	110
Platform Mount [LP 712-1]	140	(2) RRUS-11	110
(2) APXVSPP18-C-A20 w/ Mount Pipe	140	(2) RRUS-11	110
(2) APL866513-42T0 w/ Mount Pipe	127	DC6-48-60-18-8F	110
(2) SLCP 2x6014 w/ Mount Pipe	127	Platform Mount [LP 303-1]	110
(2) APL866513-42T0 w/ Mount Pipe	127	7770.00 w/ Mount Pipe	110
SLCP 2x6014 w/ Mount Pipe	127		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85.00 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.60 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50.00 mph wind.
5. TOWER RATING: 84.9%

Paul J. Ford and Company
250 East Broad Street, Suite 600
Columbus, Ohio 43215
Phone: (614) 221-6679
FAX: (614) 448-4118

Job: ***150-ft Monopole / Newton, CT / Newton/Rt-25***			
Project: ***BU# 8256222 / PJF# 37513-1642 BP***			
Client: Crown Castle	Drawn by: Kyle Thorpe, E.I.	App'd:	
Code: TIA/EIA-222-F	Date: 08/22/13	Scale: NTS	
Path: G:\TOWER\375_Crown_Castle\2013\37513-1642 BU 8262213751 3-1642 BP.eri		Dwg No. E-1	

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

TIA Rev F

Site Data

BU#: *826222*
Site Name: *Newtown/RT-25*
App #:

Pole Manufacturer:	*Pirod*

Reactions		
Moment:	3261	ft-kips
Axial:	38	kips
Shear:	31	kips

Anchor Rod Data		
Qty:	39	
Diam:	1.25	in
Rod Material:	Other	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	61	in

Plate Data		
Diam:	65	in
Thick:	1.5	in
Grade:	50	ksi
Single-Rod B-eff:	4.57	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.5	in
Width:	4.5	in
Height:	8	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	56.125	in
Thick:	0.375	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	

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

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	64.8 Kips	Service, ASD
Allowable Tension:	81.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	80.1% **Pass**	

Base Plate Results Shear Check Only

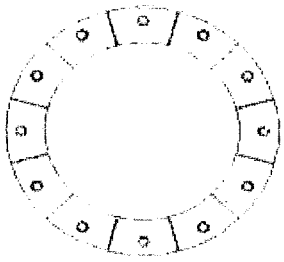
		Stiffened
Base Plate Stress:	Rohn/Pirod, OK	Service, ASD
Allowable Plate Stress:	26.7 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	Rohn/Pirod, OK	Y.L. Length: N/A, Roark

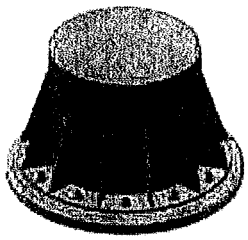
Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A





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

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

PJF job no. **37513-1642 BP** Project name **BU 826222**

Foundation Loads:

Pole weight or tower leg compression =	38	(kips)
Horizontal load at top of pier =	31	(kips)
Overturning moment at top of pier=	3261	(ft-kips)

Design criteria:

Safety factor against overturning =	1.5	

Soil Properties:

Soil density =	125	(pcf)
Allowable soil bearing =	15	(ksf)
Depth to water table =	99	(ft)

Dimensions:

Pier shape (round or square)	R	("R" or "S")
Pier width =	7	(ft)
Pier height above grade =	0.5	(ft)
depth to bottom of footing =	6	(ft)
Footing thickness =	2	(ft)
Footing width =	21	(ft)
Footing length =	21	(ft)

Concrete:

Concrete strength =	4	(ksi)
Rebar strength =	60	(ksi)
ultimate load factor =	1.3	

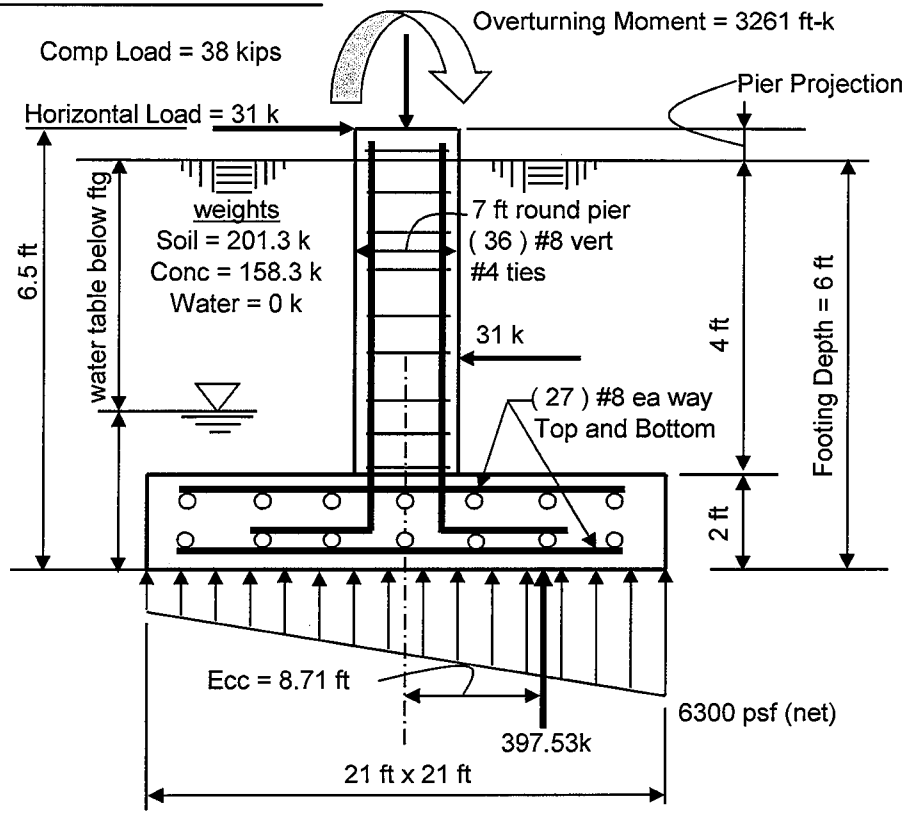
Reinforcing Steel:

	Pad	
minimum cover over rebar =	3	inches
size of pad rebar =	#8	bar
quantity of pad rebar =	27	(ea direction)

Reinforcing Steel:

	Pier	
size of vert rebar in pier=	#8	bar
vertical rebar quantity =	36	
size of pier ties =	#4	bar
minimum cover over rebar =	3	inches

Total volume of concrete = 39.1 cu yd



REINFORCING IS REQUIRED. SEE FOLLOWING PAGES.

Summary of analysis results	
Maximum Net Soil Bearing = 6.3 ksf Allowable Net Soil Bearing = 15 ksf **Soil Bearing Stress Ratio = 0.42 Okay**	Ult Bending Shear Capacity = 126 psi Ult Bending Shear Stress = 110 psi **Bending Shear Stress Ratio = 0.87 Okay**
Ftg Overturning Resistance = 4174 ft-kips Overturning Moment = 3463 ft-kips Required Overturning Safety Factor = 1.5 Overturning Safety Factor = 1.206 **Ratio = 1.24 Not OK**	Pad Bending Moment Capacity= 1800 ft-k Pad Bending Moment = 2157 ft-k **Bending Shear Stress Ratio = 1.2 Not OK**

Foundation Loads:

Pole weight or tower leg compression =	38	(kips)
Horizontal load at top of pier =	25	(kips)
Overturning moment at top of pier=	2609	(ft-kips)

Design criteria:

Safety factor against overturning =	1.5	

Soil Properties:

Soil density =	125	(pcf)
Allowable soil bearing =	15	(ksf)
Depth to water table =	99	(ft)

Dimensions:

Pier shape (round or square)	R	("R" or "S")
Pier width =	7	(ft)
Pier height above grade =	0.5	(ft)
depth to bottom of footing =	6	(ft)
Footing thickness =	2	(ft)
Footing width =	21	(ft)
Footing length =	21	(ft)

Concrete:

Concrete strength =	4	(ksi)
Rebar strength =	60	(ksi)
ultimate load factor =	1.3	

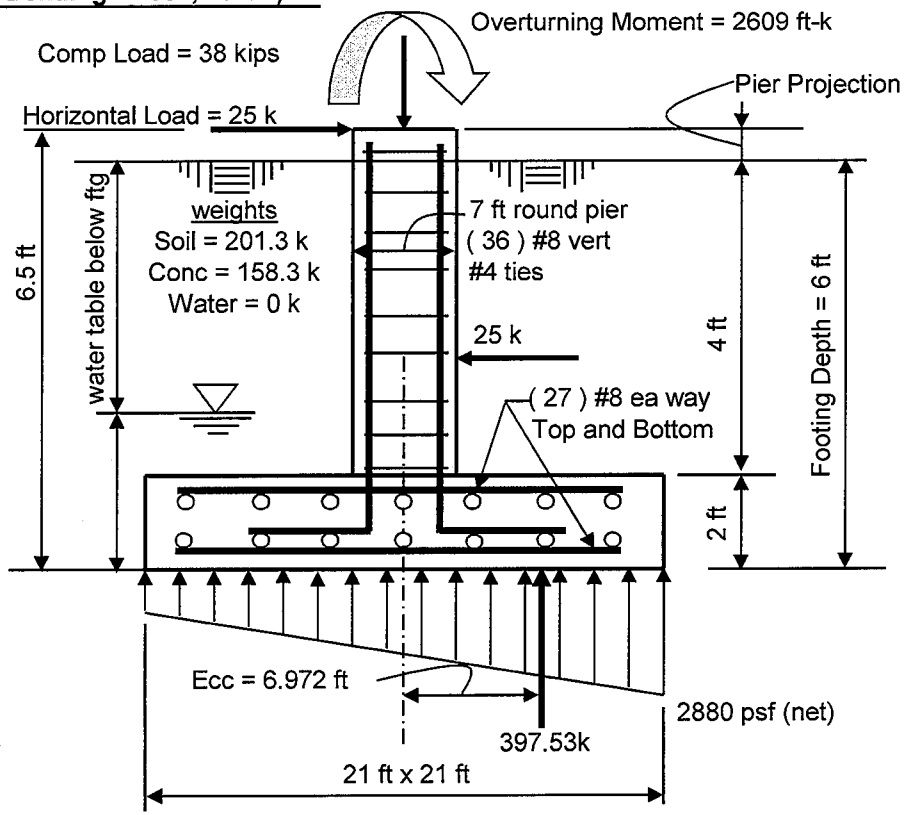
Reinforcing Steel:

	Pad	
minimum cover over rebar =	3	inches
size of pad rebar =	#8	bar
quantity of pad rebar =	27	(ea direction)

Reinforcing Steel:

	Pier	
size of vert rebar in pier=	#8	bar
vertical rebar quantity =	36	
size of pier ties =	#4	bar
minimum cover over rebar =	3	inches

Total volume of concrete = 39.1 cu yd



LOADS SHOWN ARE ASSUMED TO BE CARRIED BY BEARING OF PAD ON SOIL.
REMAINDER OF LOAD ASSUMED TO BE CARRIED BY MICROPILES.

Summary of analysis results	
Maximum Net Soil Bearing = 2.88 ksf Allowable Net Soil Bearing = 15 ksf **Soil Bearing Stress Ratio = 0.19 Okay**	Ult Bending Shear Capacity = 126 psi Ult Bending Shear Stress = 70 psi **Bending Shear Stress Ratio = 0.55 Okay**
SEE LAST PAGE OF SA PACKAGE FOR OVERTURNING CHECK	Pad Bending Moment Capacity= 1800 ft-k Pad Bending Moment = 1330 ft-k **Bending Moment Stress Ratio =** SEE NEXT PAGE

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

Page: 1 of 1
By: KAT Date: 8/20/2013
Project: 826222
Client: Crown
PROJ#: 37513-1642 BP

Revision Date: 6/17/2013

Micropile/Rock Anchor Design for Mat or Pad Pier

TNX Reactions

M =	691	k-ft
A =	0	kips
S =	0	kips

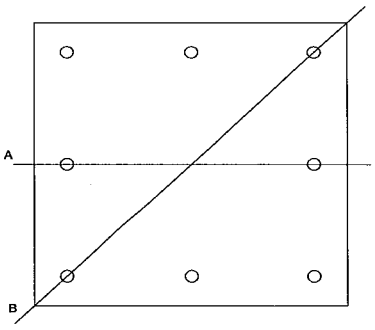
Foundation Parameters

Pier Shape =	R	
Pier Width =	7	ft
Height Above Grade =	0.5	ft
Depth to Bottom =	6	ft
Pad Thickness =	2	ft
Pad Width =	21	ft
Pad Length =	21	ft

Soil Parameters
Unit Weight = 120 pcf

Micropile/Rock Anchor Parameters

Rock Anchor Lockoff =	0	kips
Steel Yield Cap. =	218.1	kips
Steel Ultimate Cap =	260.9	ksi
Total # =	4	



Wind Side (About A)

Bolt #	#	Area, in^2	Ybar, in
1	4	3.07	62.2254
2	0		

$I_{boltsA} = \Sigma NAy^2 = 47548$ in^4
M = 8292 k-in
Soil and Foundation Compression = 87.87 kips

$f_{1A} = M*y_{bar1}/I_{boltsA} = 10.9$ ksi $C_{1A} = 121.2$ kips $T_{1A} = 0.0$ kips Capacity,k = 156.54
$f_{2A} = M*y_{bar2}/I_{boltsA} = 0$ ksi $C_{2A} = 0.0$ kips $T_{2A} = 0.0$ kips Capacity,k = 156.54

Wind Into Corner (About B)

Bolt #	#	Area, in^2	Ybar, in
1	2	3.07	88.0625
2	0		
3	0		
4	0		

$I_{boltsB} = \Sigma NAy^2 = 47616$ in^4
M = 8292 k-in
Soil and Foundation Compression = 87.87 kips

				Capacity,k
$f_{1B} = M*y_{bar1}/I_{boltsB} = 15.3$ ksi	$C_{1B} = 135.0$ kips	$T_{1B} = 0.0$ kips		156.54
$f_{2B} = M*y_{bar2}/I_{boltsB} = 0.0$ ksi	$C_{2B} = 0.0$ kips	$T_{2B} = 0.0$ kips		156.54
$f_{3B} = M*y_{bar3}/I_{boltsB} = 0.0$ ksi	$C_{3B} = 0.0$ kips	$T_{3B} = 0.0$ kips		156.54
$f_{4B} = M*y_{bar4}/I_{boltsB} = 0.0$ ksi	$C_{3B} = 0.0$ kips	$T_{3B} = 0.0$ kips		156.54

Steel Check
Revision = F

Actual Load
Max Tension/Compression Load = 135.0 kips

Capacity
Capacity = 0.6*Steel Ultimate Capacity = 156.5 kips
Stress Ratio = 86.2%

Bending Check (Wind into side)
Distance from center to end of pier = 42.0 in.
Bending Moment = Σ[# of Bolts * (ybar- 42.0 in.)*Tension] = 408.5 k-ft
Additional Pad Bending Moment from Pad & Pier Spreadsheet = 1330.0 k-ft
Use 1861.1 k-ft to analyze bending in pad
Bottom Clear Dist. = 4 in. b = 84.0 in.
f_c' = 4 ksi As = 21.33 in^2
fy = 60 ksi a = 4.48 in.
Number of Bars = 27 d = 19.5 in.
Bar # = 8
Bar Area = 0.790 in.
Bar Diameter = 1.000 in.^{2} øMn = 1969.7 k-ft Capacity = 94.5%
(Overrided from SPColumn)

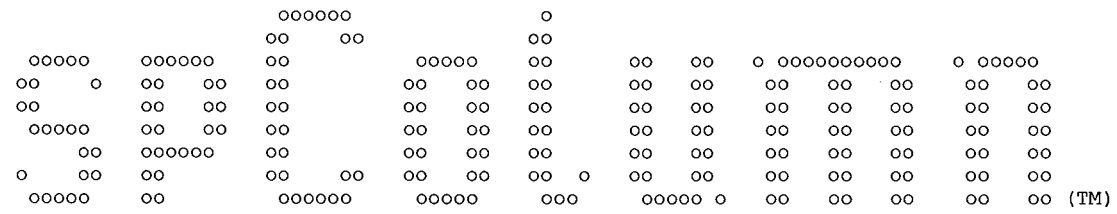
$$a = \frac{A_s * f_y}{0.85 * f'_c * b}$$

$$\phi M_n = 0.9 * A_s * f_y * \left(d - \frac{a}{2}\right)$$

Micropile Embedment Check

Hole Diameter = 10.5 in
Skin Friction = 30 psi
Actual Embed = 27 ft

Required Embedment = 22.7 ft
Ratio = 84.2%



spColumn v4.80 (TM)
Computer program for the Strength Design of Reinforced Concrete Sections

General Information:
==========

File Name: G:\TOWER\375_Crown_Castle\2013\37513-1642 BU 826222\37513-1642 BP_Pier Steel Check.col
Project:
Column:
Code: ACI 318-05

Engineer:
Units: English

Run Option: Investigation
Run Axis: X-axis

Slenderness: Not considered
Column Type: Structural

Material Properties:
==========

f'c = 4 ksi
Ec = 3605 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

fy = 60 ksi
Es = 29000 ksi

Section:
==========

Circular: Diameter = 84 in

Gross section area, Ag = 5541.77 in^2
Ix = 2.44392e+006 in^4
rx = 21 in
Xo = 0 in

Iy = 2.44392e+006 in^4
ry = 21 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; #4 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

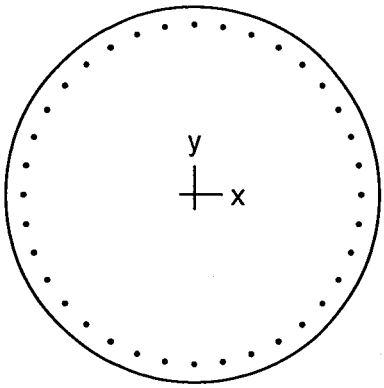
Layout: Circular
Pattern: All Sides Equal (Cover to transverse reinforcement)
Total steel area: As = 28.44 in^2 at rho = 0.51% (Note: rho < 1.0%)
Minimum clear spacing = 5.62 in

36 #8 Cover = 3 in

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

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu	NA depth in	Dt depth in	eps_t	Phi
1	0.00	4420.70	4611.67	1.043	10.79	80.00	0.01924	0.900
2	0.00	-4420.70	-4611.67	1.043	10.79	80.00	0.01924	0.900

*** End of output ***



84 in diam.

Code: ACI 318-05

Units: English

Run axis: About X-axis

Run option: Investigation

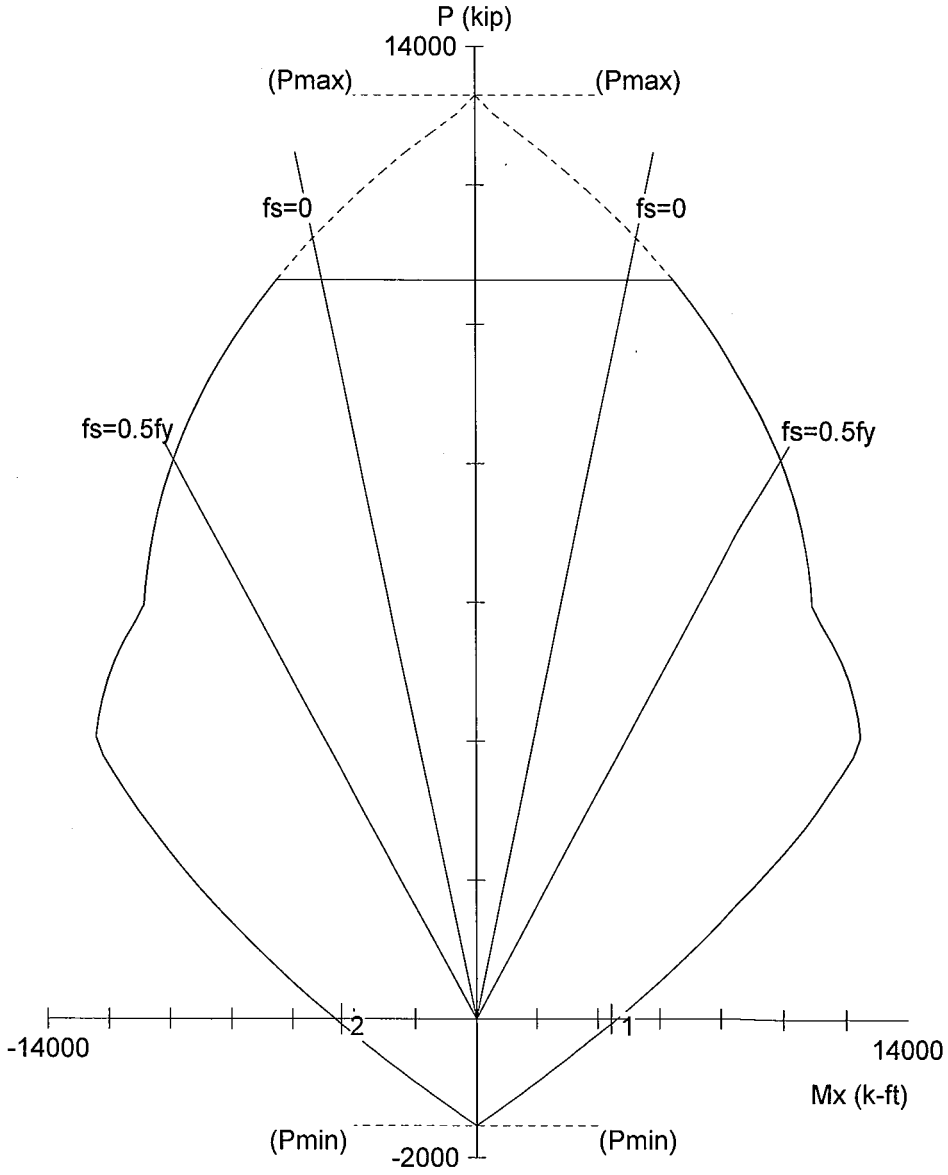
Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 08/22/13

Time: 07:59:57



spColumn v4.80. Licensed to: Paul J. Ford and Company. License ID: 60478-1036166-4-1E6CD-1E8DD

File: G:\TOWER\375_Crown_Castle\2013\37513-1642 BU 826222\37513-1642 BP_Pier Steel Check.col

Project:

Column:		Engineer:	
f'c = 4 ksi	fy = 60 ksi	Ag = 5541.77 in^2	36 #8 bars
Ec = 3605 ksi	Es = 29000 ksi	As = 28.44 in^2	rho = 0.51%
fc = 3.4 ksi		Xo = 0.00 in	Ix = 2.44392e+006 in^4
e_u = 0.003 in/in		Yo = 0.00 in	Iy = 2.44392e+006 in^4
Beta1 = 0.85		Min clear spacing = 5.62 in	Clear cover = 3.50 in

Confinement: Tied

phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Check Overturning Capacity of Foundation System

PJF job no. **37513-1642**

Assumptions: 1) Micropile reinforcing has been installed
2) Wind into side of foundation is worst case scenario

Pole base moment =	**3261**	ft-k
Pole base shear =	**31**	kips
Pole axial load =	**38**	kips
Total foundation thickness / height =	**6.5**	feet
Distance from center of pole to edge of fdn =	**10.5**	feet
Foundation weight =	**158.3**	kips
Soil weight (abv fdn) =	**201.3**	kips
Quantity of piles =	**2**	
Pile yield strength =	**218.1**	kips
Pile distance to edge of fdn =	**15.75**	feet
Overturning resistance (pole/fdn/soil) =	**4174.8**	ft-k
Overturning resistance (piles) =	**6870.2**	ft-k
Total overturning resistance =	**11045.0**	ft-k
Overturning moment at base of foundation =	**3462.5**	ft-k
Required safety factor against overturning =	**1.5**	
% Capacity =	**47.0%**	**OK**

37513-1642 PERMIT.DWG

MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

BU NUMBER; SITE NAME

BU #826222; NEWTOWN/RT-25

APP: 180205 REV. 3; WO: 600035

SITE ADDRESS

201 MAIN STREET
NEWTOWN, CT 06470
FAIRFIELD COUNTY

PROJECT NOTES

1. DETAILED FIELD INFORMATION REGARDING INTERFERENCES AND/OR EXISTING FIELD CONDITIONS MAY BE AVAILABLE ON CROWN'S CCISITES AND FROM CONTRACTOR'S PRE-MOD MAPPING. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AND COORDINATE WITH THE AVAILABLE SOURCES OF INFORMATION ABOVE AND WITH THE PROJECT PLANS BEFORE PROCEEDING WITH THE WORK. CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO PAUL J. FORD AND COMPANY AND CROWN CASTLE FIELD PERSONNEL BEFORE PROCEEDING WITH THE WORK.
2. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
3. ALL STRUCTURAL BOLTS SHALL BE FIELD INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.

PROJECT CONTACTS:

MONOPOLE OWNER:
CROWN CASTLE
8 PARKMEADOW DRIVE, PITTSFORD, NY 14534
CONTACT: STEVE TUTTLE
PH: (585) 899-3445

STRUCTURAL ENGINEER OF RECORD (EOR):
PAUL J. FORD AND COMPANY
250 EAST BROAD STREET, SUITE 600
COLUMBUS, OHIO 43215-3708
CONTACT: KYLE THORPE AT KTHORPE@PJFWEB.COM
PHONE: 614-221-6679

DESIGN STANDARD
THIS REINFORCEMENT DESIGN IS BASED UPON THE REQUIREMENTS OF THE TIA/EIA-222-F-1996 STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS, USING A DESIGN BASIC WIND SPEED OF 85 MPH (FASTEST MILE) WITH NO ICE, 37.6 MPH WITH 3/4 INCH ICE AND 50 MPH SERVICE LOADS.
REFER TO THE POLE DESIGN AND ANTENNA LOADING DOCUMENTED IN THE PJF STRUCTURAL ANALYSIS FOR THIS SITE (PJF#37513-1642), DATED 8-20-2013.
THIS PROJECT INCLUDES THE FOLLOWING REINFORCING ELEMENTS:
FOUNDATION AUGMENTATION: MICROPILES

SHEET INDEX

PAUL J. FORD AND COMPANY
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BU #826222; NEWTOWN/RT-25
NEWTOWN, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37513-1642	ISSUE DATE OF PERMIT: 8-20-2013
DRAWN BY: B.M.S.	
CHECKED BY: K.A.T.	
APPROVED BY:	T-1
DATE: 8-20-2013	

CROWN CASTLE PROJECT: BU #826222; NEWTOWN/RT-25; NEWTOWN, CT
MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV. 2, 1/22/2009)

A. GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO FABRICATION AND CONSTRUCTION. THESE DRAWINGS WERE PREPARED FROM INFORMATION AND DOCUMENTS PROVIDED TO PAUL J. FORD & COMPANY BY CROWN CASTLE. THIS INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY PAUL J. FORD & COMPANY FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. ANY DISCREPANCIES AND/OR CHANGES BETWEEN THE INFORMATION CONTAINED IN THESE DRAWINGS AND THE ACTUAL VERIFIED SITE CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF CROWN CASTLE AND PAUL J. FORD & COMPANY SO THAT ANY CHANGES AND/OR ADJUSTMENTS, IF NECESSARY, CAN BE MADE TO THE DESIGN AND DRAWINGS.
2. THE EXISTING UNREINFORCED MONOPOLE STRUCTURE DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE ANTENNA AND PLATFORM LOADS SHOWN ON THESE DRAWINGS AT THE REQUIRED MINIMUM TIA/EIA-222-F BASIC WIND SPEEDS. DO NOT INSTALL ANY ADDITIONAL OR NEW ANTENNA AND PLATFORM LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.
3. IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR GREATER QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.
4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN PROPERLY AND ADEQUATELY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO INSURE THE SAFETY AND STABILITY OF THE MONOPOLE AND ITS COMPONENT PARTS DURING FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT. IMPORTANT CUTTING, WELDING AND SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES, PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES FROM CROWN CASTLE. PER THE 12-01-2005 CROWN CASTLE DIRECTIVE: "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CROWN CASTLE POLICY 'CUTTING AND WELDING PLAN' (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT".
5. THE STRUCTURAL CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES.
6. ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY THE INSPECTION/TESTING AGENCY. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
7. ALL MATERIALS AND EQUIPMENT FURNISHED WILL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO INSURE THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK AS WELL AS CROWN CASTLE SAFETY GUIDELINES.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.
10. ANY EXISTING ATTACHMENTS AND/OR PROJECTIONS ON THE POLE THAT MAY INTERFERE WITH THE INSTALLATION OF THE REINFORCING SYSTEM WILL HAVE TO BE REMOVED, AND/OR RELOCATED, AND/OR REPLACED AND RE-INSTALLED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH THE OWNER, TESTING AGENCY, AND ENGINEER.
11. ANY AND ALL EXISTING PLATFORMS THAT ARE LOCATED IN AREAS OF THE POLE SHAFT WHERE SHAFT REINFORCING MUST BE APPLIED SHALL BE TEMPORARILY REMOVED OR OTHERWISE SUPPORTED TO PERMIT NEW CONTINUOUS REINFORCEMENT TO BE ATTACHED. AFTER THE CONTRACTOR HAS SUCCESSFULLY INSTALLED THE MONOPOLE REINFORCEMENT SYSTEM, THE CONTRACTOR SHALL RE-INSTALL THE PLATFORMS. IN NO CASE SHALL ANY NEW AND/OR ADDITIONAL PLATFORMS AND/OR ANTENNAS AND/OR COAX CABLES AND/OR OTHER EQUIPMENT BE INSTALLED ON THE MONOPOLE UNTIL THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF ALL OF THE REQUIRED STRUCTURAL REINFORCING SYSTEM COMPONENTS.

B. (SECTION NOT USED)

C. SPECIAL INSPECTION AND TESTING

1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY THE OWNER'S REPRESENTATIVE AND THE OWNER'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY. REFER TO CROWN CASTLE DOCUMENT ENG-SOW-10066 FOR SPECIFICATION.
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 - (NOT REQUIRED)
   F. SPECIAL INSPECTION OF EXISTING SHAFT-TO-FLANGE WELD CONNECTIONS - (NOT REQUIRED)
   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.

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BU #826222; NEWTOWN/RT-25
NEWTOWN, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37513-1642	ISSUE DATE OF PERMIT: 8-20-2013
DRAWN BY: B.M.S.	
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D. **STRUCTURAL STEEL**

1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:
   A. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
      (A.) "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS."
      (B.) "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS OF THE ENGINEERING FOUNDATION.
      (C.) "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES" (PARAGRAPH 4.2.1 SPECIFICALLY EXCLUDED).
   B. BY THE AMERICAN WELDING SOCIETY (AWS):
      (A.) "STRUCTURAL WELDING CODE - STEEL D1.1."
      (B.) "SYMBOLS FOR WELDING AND NON-DESTRUCTIVE TESTING"
2. ANY MATERIAL OR WORKMANSHIP WHICH IS OBSERVED TO BE DEFECTIVE OR INCONSISTENT WITH THE CONTRACT DOCUMENTS SHALL BE CORRECTED, MODIFIED, OR REPLACED AT THE CONTRACTOR'S EXPENSE.
3. TIGHTEN ALL STRUCTURAL BOLTS, INCLUDING THE AJAX M20 BOLTS WITH SHEAR SLEEVES, ACCORDING TO THE REQUIREMENTS OF THE AISC "TURN OF THE NUT" METHOD. TIGHTEN BOLTS 1/3 TURN PAST THE SNUG TIGHT CONDITION AS DEFINED BY AISC.
4. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1. ALL WELD ELECTRODES SHALL BE E80XX UNLESS NOTED OTHERWISE ON THE DRAWINGS.
5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO THE OWNER'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65 (FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
7. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION I NOTES REGARDING TOUCH-UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.
8. UNLESS OTHERWISE NOTED, ALL STEEL MEMBERS SHALL BE HOT-DIP GALVANIZED, AFTER FABRICATION, IN ACCORDANCE WITH ASTM A123. SEE SECTION J FOR FURTHER NOTES AND FOR EXCEPTIONS (IF ANY).
9. ALL WELDS SHALL BE VISUALLY INSPECTED BY THE OWNER'S APPROVED TESTING AGENCY. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT. THE CONTRACTOR SHALL COOPERATE WITH THE TESTING AGENCY IN THEIR TESTING EFFORTS.
10. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
11. FIELD CUTTING OF STEEL:
    (A.) PRIOR TO ANY FIELD CUTTING, THE CONTRACTOR SHALL MARK THE CUT OUTLINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS.
    (B.) ANY REQUIRED CUTS IN THE STEEL SHALL BE CAREFULLY CUT BY MECHANICAL METHODS SUCH AS DRILLING, SAW CUTTING, AND GRINDING. THE CONTRACTOR IS RESPONSIBLE TO PREVENT ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, DURING THE CUTTING WORK. ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
    (C.) ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.

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

F. **FOUNDATION WORK**

1. THE CONTRACTOR SHALL PROTECT THE EXISTING MONOPOLE STRUCTURE, AS WELL AS ANY OTHER NEARBY EXISTING FOUNDATIONS FOR OTHER STRUCTURES OR EQUIPMENT, FROM LOSS OF SOIL AROUND AND/OR BENEATH FOOTINGS DURING ANY REQUIRED EXCAVATION. THE CONTRACTOR SHALL BRACE THE SIDES OF THE OPEN EXCAVATION AS REQUIRED.
2. THE EFFECT OF ADDITIONAL EXCAVATION (WHERE REQUIRED) FOR THE NEW MAT FOOTING (WHERE REQUIRED) OR OTHER FOUNDATION AUGMENTATION AND REINFORCING (WHERE REQUIRED) MAY HAVE IMPACT ON EXISTING EQUIPMENT AND/OR OTHER EXISTING STRUCTURES NEAR THE EXCAVATION. (ENGINEER-OF- RECORD) HAS NOT BEEN PROVIDED WITH ANY SPECIFIC INFORMATION OR DETAILS REGARDING EXISTING EQUIPMENT OR OTHER EXISTING STRUCTURES ON THE SITE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE IMPACT OR EFFECT THAT ANY REQUIRED EXCAVATION WORK HAS ON ANY EXISTING NEARBY EQUIPMENT AND/OR STRUCTURES. CONTRACTOR SHALL COORDINATE THIS SITE-SPECIFIC INFORMATION WITH THE OWNER AND TESTING AGENCY PRIOR TO CONSTRUCTION AND FOUNDATION WORK. THE CONTRACTOR SHALL ADEQUATELY BRACE, SHORE, AND/OR RELOCATE (AFTER OBTAINING THE PRIOR WRITTEN PERMISSION OF THE OWNER), AS NECESSARY, THE INTERFERING EXISTING NEARBY EQUIPMENT AND/OR STRUCTURES.

G. **CAST-IN-PLACE CONCRETE**

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS.
   (A.) CONCRETE EXPOSED TO WEATHER SHALL BE AIR ENTRAINED (6% +/- 1.5%).
   (B.) WATER CEMENT RATIO = 0.52 (MAXIMUM).
2. ALL REINFORCING STEEL SHALL BE NEW DOMESTIC DEFORMED BILLET STEEL CONFORMING TO ASTM A615 GRADE 60.
3. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH "THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" ACI 318, LATEST EDITION.
   CONTRACTOR SHALL FOLLOW ALL APPLICABLE ACI PROCEDURES FOR COLD WEATHER CONCRETE PLACEMENT.
4. ALL REINFORCING DETAILS SHALL CONFORM TO "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES" ACI 315, LATEST EDITION, UNLESS DETAILED OTHERWISE ON THE STRUCTURAL DRAWINGS.
5. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL OPENINGS, SLEEVES, ANCHOR RODS, INSERTS, ETC., AS REQUIRED BEFORE CONCRETE IS PLACED.
6. WHERE BAR LENGTHS ARE GIVEN ON THE DRAWINGS, THE LENGTH OF ANY HOOK, IF REQUIRED, IS NOT INCLUDED.
7. CONTRACTOR SHALL PROVIDE SPACERS, CHAIRS, BOLSTERS, ETC., NECESSARY TO SUPPORT REINFORCING STEEL. CHAIRS WHICH BEAR ON EXPOSED CONCRETE SURFACES SHALL HAVE ENDS WHICH ARE PLASTIC TIPPED OR STAINLESS STEEL.
8. ALL STRUCTURAL MEMBERS SHALL BE POURED MONOLITHICALLY, EXCEPT FOR REQUIRED CONSTRUCTION JOINTS. CONTRACTOR SHALL SUBMIT PROPOSED CONSTRUCTION JOINT LOCATIONS AND DETAILS TO THE ENGINEER FOR REVIEW.
9. CONTRACTOR SHALL PROVIDE 3/4-INCH CHAMFER ON ALL EXPOSED CORNERS UNLESS OTHERWISE INDICATED ON THE DRAWINGS. MINIMUM CLEARANCES FOR REINFORCING STEEL SHALL BE MAINTAINED AS SPECIFIED BY ACI.
10. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT:
    3" ..... CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH.
    2" ..... CONCRETE EXPOSED TO EARTH OR WEATHER, #6 THROUGH #18 BARS.
    1-1/2" ..... CONCRETE EXPOSED TO EARTH OR WEATHER, #5 BAR AND SMALLER.
11. FOOTING BARS SHALL BE BENT 1'-6" AROUND CORNERS, OR PROVIDE CORNER BARS WITH A 2'-0" LAP ON EACH LEG.
12. TESTING LABORATORY SHALL SUBMIT ONE COPY OF ALL CONCRETE TEST REPORTS DIRECTLY TO THE ENGINEER.
13. CONTRACTOR SHALL KEEP A COPY OF "FIELD REFERENCE MANUAL" (ACI PUBLICATION SP-15, LATEST EDITION) AT THE PROJECT FIELD OFFICE.
    FLY ASH SHALL BE PERMITTED. FLY ASH CONTENT SHALL BE A MAXIMUM OF 25% OF CEMENT WEIGHT

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

I. **TOUCH UP OF GALVANIZING - (NOT REQUIRED)**

J. **HOT DIP GALVANIZING - (NOT REQUIRED)**

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

1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY THE OWNER, THE OWNER WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.
2. THE MONOPOLE REINFORCING SYSTEM INDICATED IN THESE DOCUMENTS USES REINFORCING COMPONENTS THAT INVOLVE FIELD WELDING STEEL MEMBERS TO THE EXISTING GALVANIZED STEEL POLE STRUCTURE. THESE FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. **ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE CONNECTED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT THE OWNER REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.**
3. THE OWNER SHALL REFER TO TIA/EIA-222-F-1996, SECTION 14 AND ANNEX E FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY THE OWNER BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. **PAUL J. FORD & COMPANY RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT.** ACCORDING TO TIA/EIA-222-F-1996 SECTION 14.1, NOTE 1: "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

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PH: (585) 899-3445 FAX: (585) 899-3448

BU #826222; NEWTOWN/RT-25
NEWTOWN, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37513-1642	ISSUE DATE OF PERMIT: 8-20-2013
DRAWN BY: B.M.S.	
CHECKED BY: K.A.T.	
APPROVED BY:	S-2
DATE: 8-20-2013	

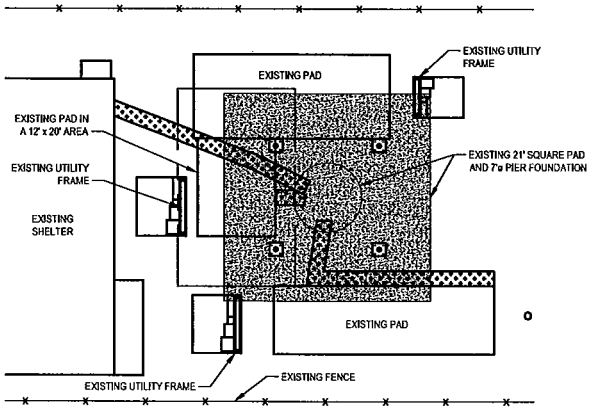
37513-1642 PERMIT.DWG

POLE SPECIFICATIONS	
POLE SHAPE TYPE:	18-SIDED POLYGON
TAPER:	0.244408 IN/FT
SHAFT STEEL:	ASTM A572 GRADE 65
BASE PL STEEL:	ASTM A572 GRADE 50
ANCHOR RODS:	1 1/4"ø ASTM A36

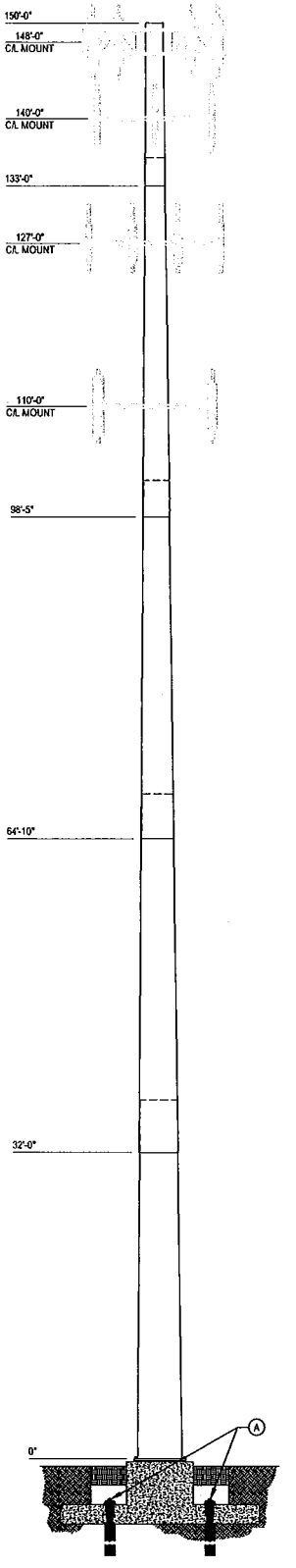
SHAFT SECTION DATA					
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN)	
				@ TOP	@ BOTTOM
1	17.00	0.2500	35.40	21.830	26.000
2	37.50	0.3125	46.20	24.776	34.063
3	37.50	0.3750	56.40	32.484	41.750
4	37.50	0.3750	66.00	39.839	49.063
5	37.50	0.3750		46.960	56.125
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES					

MODIFICATIONS:

(A) INSTALL (4) NEW MICROPILES IN EXISTING FOUNDATION. SEE SHEET S-4 & S-5.



PARTIAL SITE MAP 2 S-3



POLE ELEVATION 1 S-3

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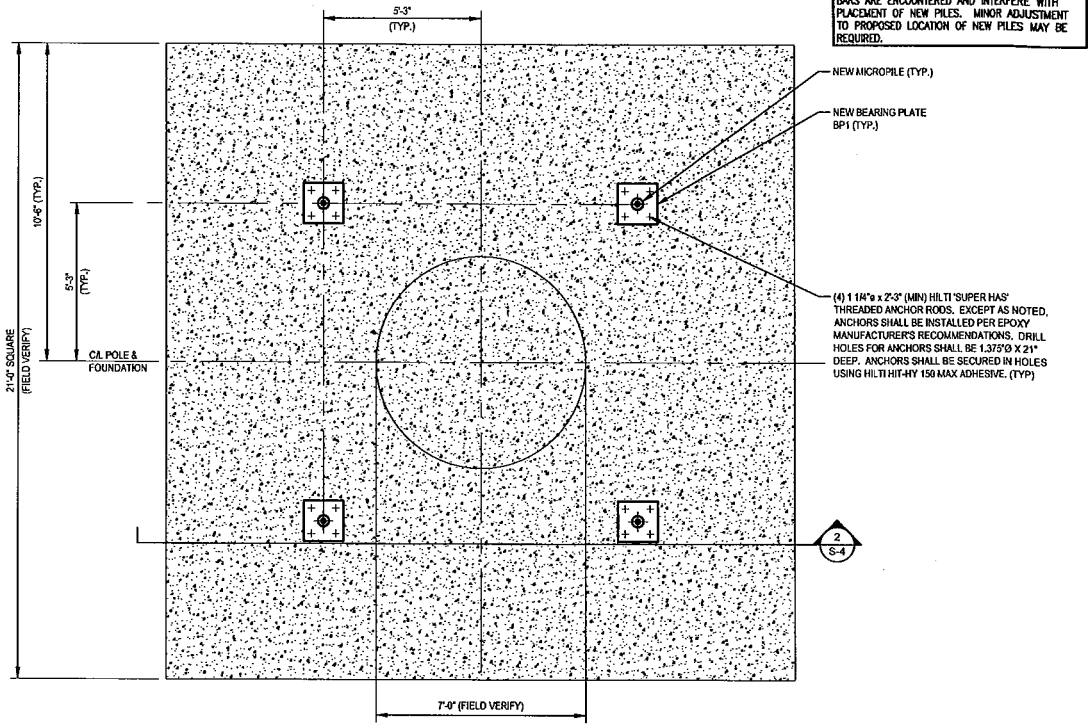
MICROPILE TESTING REQUIREMENTS

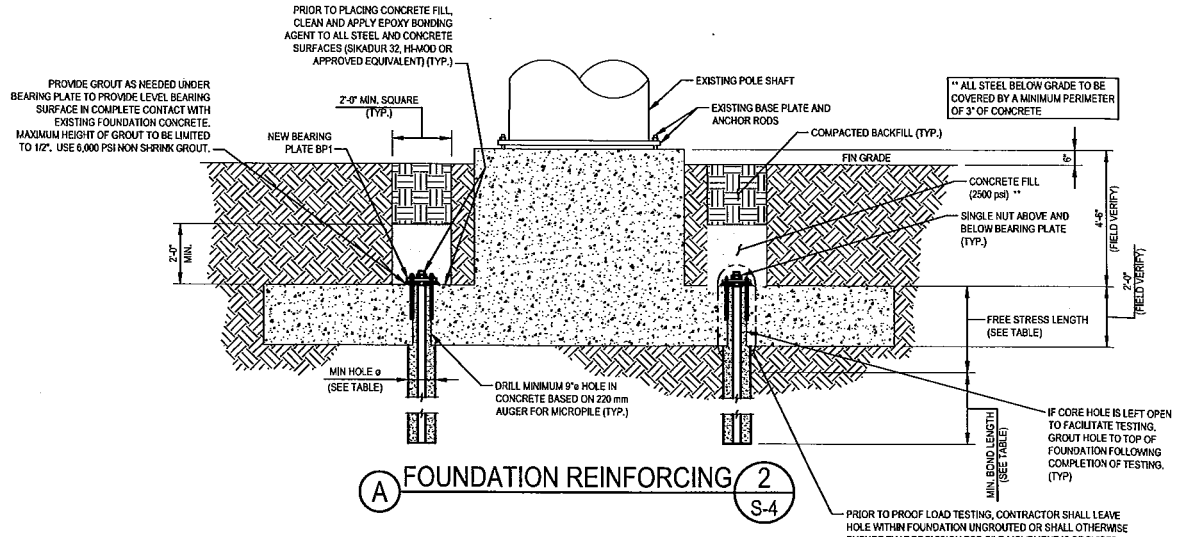
A MINIMUM OF 2 IN-PLACE MICROPILES (TEST PILES SHALL BE IN OPPOSITE CORNERS) ARE TO BE TESTED TO 208k IN TENSION. ALL PILE TESTING SHALL BE CARRIED OUT IN GENERAL CONFORMANCE WITH ASTM D3689. A HYDRAULIC JACK MAY BE SUBSTITUTED FOR THE PILE TESTING SET-UPS SHOWN IN THE ASTM SPECS. IF A HYDRAULIC JACK IS USED, FOLLOW EQUIPMENT GUIDELINES DISCUSSED IN THE POST TENSIONING INSTITUTE "RECOMMENDATIONS FOR PRESTRESSED ROCK AND SOIL ANCHORS" DESIGN GUIDE, SECTION 8.2. PILES SHALL BE LOADED USING PTI'S PROOF TEST METHODOLOGY (REFER TO SECTION 8.3.3 OF THE PTI DESIGN GUIDE; ALIGNMENT LOAD, AL, SHALL BE 16 KIPS; DESIGN LOAD, DL, IS 156 KIPS). PROVISION SHALL BE MADE TO ALLOW FOR MOVEMENT BETWEEN MICROPILE CROSS-SECTION AND SOIL SO THAT GROUT-TO-SOIL BOND LINE IS ADEQUATELY TESTED.

CONTECH'S 73/53 HOLLOW BAR MICROPILE OR EQUIVALENT SYSTEM.

TAKE ALL MEASURES NECESSARY TO AVOID DAMAGING EXISTING REINFORCING BARS DURING DRILLING OPERATIONS. NOTIFY PAUL J. FORD AND COMPANY IMMEDIATELY IF EXISTING REINFORCING BARS ARE ENCOUNTERED AND INTERFERE WITH PLACEMENT OF NEW PILES. MINOR ADJUSTMENT TO PROPOSED LOCATION OF NEW PILES MAY BE REQUIRED.



A FOUNDATION REINFORCING PLAN 1 S-4



A FOUNDATION REINFORCING 2 S-4

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BU #826222; NEWTOWN/RT-25
NEWTOWN, CT
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PROJECT No: 37513-1642	ISSUE DATE OF PERMIT: 8-20-2013
DRAWN BY: B.M.S.	
CHECKED BY: K.A.T.	
APPROVED BY:	S-4
DATE: 8-20-2013	

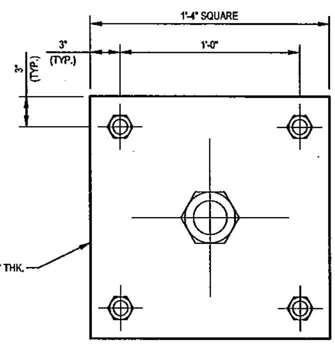
MICROPILE NOTES:

1. ALL HOLLOW BAR STEEL AND ASSOCIATED HARDWARE SHALL BE SUPPLIED BY CON-TECH SYSTEMS OR OWNER/EOR APPROVED EQUIVALENT.
2. ALL HOLLOW BAR, NUTS AND BEARING PLATES SHALL BE HOT-DIP GALVANIZED PER ASTM A123 OR A153, AS APPROPRIATE.
3. CONTACT CON-TECH SYSTEMS (OR MANUFACTURER OF APPROVED ALTERNATE) FOR MATERIALS AND INSTALLATION PROCEDURES AND RECOMMENDATIONS.
4. SPECIAL INSPECTION OF THE MICROPILES IS REQUIRED AS FOLLOWS: (1) VERIFY THAT MICROPILE MATERIAL, SIZE AND LENGTH COMPLY WITH THE INFORMATION SHOWN ON THIS DRAWING, (2) VERIFY PLACEMENT OF EACH MICROPILE, (3) OBSERVE DRILLING, GROUTING AND TESTING (AS APPROPRIATE) OPERATIONS FOR EACH MICROPILE AND MAINTAIN COMPLETE AND ACCURATE RECORDS FOR EACH MICROPILE.
5. FOUNDATION DESIGN IS BASED ON THE GEOTECHNICAL REPORT PREPARED BY FDH, PROJECT NO. 1305751600, DATED 8/15/13.
6. CONTACT CONTECH SYSTEMS (OR MANUFACTURER OF APPROVED ALTERNATE) TO VERIFY NUT & WASHER CONNECTION ARE COMPATIBLE WITH MICROPILE THREADS.
7. ALL MICROPILES SHALL BE GROUTED FOR FULL HEIGHT. GROUT TO BE 4,000 PSI MIN COMPRESSION STRENGTH WITH 0.5 (MAXIMUM WATER/CEMENT) W/C RATIO (TO BE COLLOIDALLY MIXED FOR MICROPILE).

PRELIMINARY PILE DESIGN PARAMETER SCHEDULE*

PARAMETER / OPTIONS	MIN. HOLE ø/STEEL AREA	ALLOWABLE PILE CAPACITY (kips)	ULTIMATE SKIN FRICTION (PSI)	FREE STRESS LENGTH	FRICTION DEVELOPMENT LENGTH/BOND LENGTH	ROCK SOCKET/ PLUNGE LENGTH	TOTAL EMBEDMENT LENGTH
MICROPILE	10.5"ø / 2.53 IN^2 MIN.	156K	SEE GEOTECH REPORT	5'	27' MIN.	N.A.	33' MIN.

* THE FINAL DESIGN GROUT DIAMETER IS BASED ON A MINIMUM 220MM AUGER IN SILTY SAND. THE DESIGN REQUIRES UNCASED MICROPILES FOR THE LISTED CAPACITY IN TENSION AND COMPRESSION AS LAID OUT PER PLAN. THE CONTRACTOR/MICROPILE INSTALLER IS RESPONSIBLE FOR THE MEANS AND METHODS TO ENSURE THE NECESSARY CAPACITY AND WILL DEMONSTRATE THE INSTALLED CAPACITY PER THE SPECIFIED TESTING. THE EMBEDMENT DEPTH AND AUGER/GROUT DIAMETERS ARE LISTED AS A PRELIMINARY BASIS FOR BIDDING. THE INTENT IS FOR THE INSTALLER TO REVIEW THE CURRENT SOIL INFORMATION AND DESIGN REQUIREMENTS TO ENSURE THAT THE CONTRACTOR'S SPECIFIC EQUIPMENT OR INSTALLATION TECHNIQUE IS APPROPRIATE. IF THE CONTRACTOR BELIEVES THE SCOPE SHOULD CHANGE UPON REVIEW, PLEASE ADDRESS PRIOR TO BIDDING. AS REQUIRED, PLEASE COORDINATE WITH ENGINEER OF RECORD PRIOR TO INSTALLATION.



NEW BEARING PLATE MK~BP1

(Fy=60 KSI) (TYP. 4 LOCATIONS)

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MODIFICATION INSPECTION NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MI CHECKLIST	
CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
PRE-CONSTRUCTION	
X	MI CHECKLIST DRAWINGS
X	EOR APPROVED SHOP DRAWINGS
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS: PRIOR TO CONSTRUCTION, CONTRACTOR SHALL SUBMIT PILE INSTALLATION AND TESTING PLAN TO CROWN AND PJF FOR REVIEW. TESTING PLAN SHALL INCLUDE DETAILS REGARDING HOW CONTRACTOR INTENDS TO PREVENT INTERACTION BETWEEN THE TEST PILE AND THE EXISTING FOUNDATION DURING TESTING.	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
X	FOUNDATION INSPECTIONS
X	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
NA	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: LIFT AND DENSITY
NA	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	THIRD PARTY ONSITE INSPECTION OF BOLT PRETENSION PER CROWN REQUIREMENTS
NA	INSPECTION OF AJAX BOLTS AND DTI'S PER REQUIREMENTS ON SHEET S-3
ADDITIONAL TESTING AND INSPECTIONS: VERIFY MICROPILE INSTALLATION DETAILS, SPECIFICALLY MICROPILE SIZES, DRILL HOLE DIAMETERS & DEPTHS, GROUT f'c AND THAT INSTALLATION WAS PER MANUFACTURER RECOMMENDATION	
POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	THIRD PARTY ONSITE BOLT INSPECTION REPORT
NA	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS: PROVIDE REPORT DOCUMENTING RESULTS OF MICROPILE INSTALLATION AND PROOF TESTING	

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

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APPROVED BY:	S-6
DATE: 8-20-2013	

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MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

BU NUMBER; SITE NAME

BU #826222; NEWTOWN/RT-25

APP: 180205 REV. 3; WO: 600035

SITE ADDRESS

201 MAIN STREET
NEWTOWN, CT 06470
FAIRFIELD COUNTY

PROJECT NOTES

1. DETAILED FIELD INFORMATION REGARDING INTERFERENCES AND/OR EXISTING FIELD CONDITIONS MAY BE AVAILABLE ON CROWN'S CCISITES AND FROM CONTRACTOR'S PRE-MOD MAPPING. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AND COORDINATE WITH THE AVAILABLE SOURCES OF INFORMATION ABOVE AND WITH THE PROJECT PLANS BEFORE PROCEEDING WITH THE WORK. CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO PAUL J. FORD AND COMPANY AND CROWN CASTLE FIELD PERSONNEL BEFORE PROCEEDING WITH THE WORK.
2. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
3. ALL STRUCTURAL BOLTS SHALL BE FIELD INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.

PROJECT CONTACTS:

MONOPOLE OWNER:
CROWN CASTLE
8 PARKMEADOW DRIVE, PITTSFORD, NY 14534
CONTACT: STEVE TUTTLE
PH: (585) 899-3445

STRUCTURAL ENGINEER OF RECORD (EOR):
PAUL J. FORD AND COMPANY
250 EAST BROAD STREET, SUITE 600
COLUMBUS, OHIO 43215-3708
CONTACT: KYLE THORPE AT KTHORPE@PJFWEB.COM
PHONE: 614-221-6679

DESIGN STANDARD

THIS REINFORCEMENT DESIGN IS BASED UPON THE REQUIREMENTS OF THE TIA/EIA-222-F-1996 STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS, USING A DESIGN BASIC WIND SPEED OF 85 MPH (FASTEST MILE) WITH NO ICE, 37.6 MPH WITH 3/4 INCH ICE AND 50 MPH SERVICE LOADS.

REFER TO THE POLE DESIGN AND ANTENNA LOADING DOCUMENTED IN THE PJF STRUCTURAL ANALYSIS FOR THIS SITE (PJF#37513-1642), DATED 8-20-2013.

THIS PROJECT INCLUDES THE FOLLOWING REINFORCING ELEMENTS:

FOUNDATION AUGMENTATION: MICROPILES

SHEET INDEX

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

AUG 2 1 2013

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
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CROWN CASTLE
8 PARKMEADOW DRIVE, PITTSFORD, NY 14534
PH: (585) 899-3445 FAX: (585) 899-3448

BU #826222; NEWTOWN/RT-25
NEWTOWN, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No:	37513-1642
DRAWN BY:	B.M.S.
CHECKED BY:	K.A.T.
APPROVED BY:	KH
DATE:	8-20-2013

ISSUE DATE OF PERMIT: 8-20-2013

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CROWN CASTLE PROJECT: BU #826222; NEWTOWN/RT-25; NEWTOWN, CT
MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV. 2, 1/22/2009)

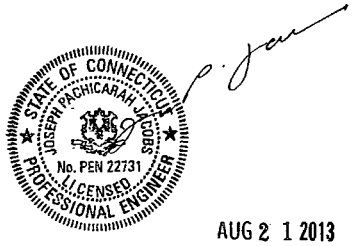
A. GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO FABRICATION AND CONSTRUCTION. THESE DRAWINGS WERE PREPARED FROM INFORMATION AND DOCUMENTS PROVIDED TO PAUL J. FORD & COMPANY BY CROWN CASTLE. THIS INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY PAUL J. FORD & COMPANY FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. ANY DISCREPANCIES AND/OR CHANGES BETWEEN THE INFORMATION CONTAINED IN THESE DRAWINGS AND THE ACTUAL VERIFIED SITE CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF CROWN CASTLE AND PAUL J. FORD & COMPANY SO THAT ANY CHANGES AND/OR ADJUSTMENTS, IF NECESSARY, CAN BE MADE TO THE DESIGN AND DRAWINGS.
2. THE EXISTING UNREINFORCED MONOPOLE STRUCTURE DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE ANTENNA AND PLATFORM LOADS SHOWN ON THESE DRAWINGS AT THE REQUIRED MINIMUM TIA/EIA-222-F BASIC WIND SPEEDS. DO NOT INSTALL ANY ADDITIONAL OR NEW ANTENNA AND PLATFORM LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.
3. IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR GREATER QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.
4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN PROPERLY AND ADEQUATELY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO INSURE THE SAFETY AND STABILITY OF THE MONOPOLE AND ITS COMPONENT PARTS DURING FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT. IMPORTANT CUTTING, WELDING AND SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES FROM CROWN CASTLE. PER THE 12-01-2005 CROWN CASTLE DIRECTIVE: "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CROWN CASTLE POLICY 'CUTTING AND WELDING PLAN' (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT".
5. THE STRUCTURAL CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES.
6. ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY THE INSPECTION/TESTING AGENCY. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
7. ALL MATERIALS AND EQUIPMENT FURNISHED WILL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO INSURE THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK AS WELL AS CROWN CASTLE SAFETY GUIDELINES.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.
10. ANY EXISTING ATTACHMENTS AND/OR PROJECTIONS ON THE POLE THAT MAY INTERFERE WITH THE INSTALLATION OF THE REINFORCING SYSTEM WILL HAVE TO BE REMOVED, AND/OR RELOCATED, AND/OR REPLACED AND RE-INSTALLED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH THE OWNER, TESTING AGENCY, AND ENGINEER.
11. ANY AND ALL EXISTING PLATFORMS THAT ARE LOCATED IN AREAS OF THE POLE SHAFT WHERE SHAFT REINFORCING MUST BE APPLIED SHALL BE TEMPORARILY REMOVED OR OTHERWISE SUPPORTED TO PERMIT NEW CONTINUOUS REINFORCEMENT TO BE ATTACHED. AFTER THE CONTRACTOR HAS SUCCESSFULLY INSTALLED THE MONOPOLE REINFORCEMENT SYSTEM, THE CONTRACTOR SHALL RE-INSTALL THE PLATFORMS. IN NO CASE SHALL ANY NEW AND/OR ADDITIONAL PLATFORMS AND/OR ANTENNAS AND/OR COAX CABLES AND/OR OTHER EQUIPMENT BE INSTALLED ON THE MONOPOLE UNTIL THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF ALL OF THE REQUIRED STRUCTURAL REINFORCING SYSTEM COMPONENTS.

B. (SECTION NOT USED)

C. SPECIAL INSPECTION AND TESTING

1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY THE OWNER'S REPRESENTATIVE AND THE OWNER'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY. REFER TO CROWN CASTLE DOCUMENT ENG-SOW-10066 FOR SPECIFICATION.
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 - (NOT REQUIRED)
   F. SPECIAL INSPECTION OF EXISTING SHAFT-TO-FLANGE WELD CONNECTIONS - (NOT REQUIRED)
   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.



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D. STRUCTURAL STEEL

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

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

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

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

E. BASE PLATE GROUT - (NOT REQUIRED)

F. FOUNDATION WORK

1. THE CONTRACTOR SHALL PROTECT THE EXISTING MONOPOLE STRUCTURE, AS WELL AS ANY OTHER NEARBY EXISTING FOUNDATIONS FOR OTHER STRUCTURES OR EQUIPMENT, FROM LOSS OF SOIL AROUND AND/OR BENEATH FOOTINGS DURING ANY REQUIRED EXCAVATION. THE CONTRACTOR SHALL BRACE THE SIDES OF THE OPEN EXCAVATION AS REQUIRED.
2. THE EFFECT OF ADDITIONAL EXCAVATION (WHERE REQUIRED) FOR THE NEW MAT FOOTING (WHERE REQUIRED) OR OTHER FOUNDATION AUGMENTATION AND REINFORCING (WHERE REQUIRED) MAY HAVE IMPACT ON EXISTING EQUIPMENT AND/OR OTHER EXISTING STRUCTURES NEAR THE EXCAVATION. (ENGINEER-OF- RECORD) HAS NOT BEEN PROVIDED WITH ANY SPECIFIC INFORMATION OR DETAILS REGARDING EXISTING EQUIPMENT OR OTHER EXISTING STRUCTURES ON THE SITE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE IMPACT OR EFFECT THAT ANY REQUIRED EXCAVATION WORK HAS ON ANY EXISTING NEARBY EQUIPMENT AND/OR STRUCTURES. CONTRACTOR SHALL COORDINATE THIS SITE-SPECIFIC INFORMATION WITH THE OWNER AND TESTING AGENCY PRIOR TO CONSTRUCTION AND FOUNDATION WORK. THE CONTRACTOR SHALL ADEQUATELY BRACE, SHORE, AND/OR RELOCATE (AFTER OBTAINING THE PRIOR WRITTEN PERMISSION OF THE OWNER), AS NECESSARY, THE INTERFERING EXISTING NEARBY EQUIPMENT AND/OR STRUCTURES.

G. CAST-IN-PLACE CONCRETE

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS.
   (A.) CONCRETE EXPOSED TO WEATHER SHALL BE AIR ENTRAINED (6% +/- 1.5%).
   (B.) WATER CEMENT RATIO = 0.52 (MAXIMUM).
2. ALL REINFORCING STEEL SHALL BE NEW DOMESTIC DEFORMED BILLET STEEL CONFORMING TO ASTM A615 GRADE 60.
3. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH "THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" ACI 318, LATEST EDITION.
   CONTRACTOR SHALL FOLLOW ALL APPLICABLE ACI PROCEDURES FOR COLD WEATHER CONCRETE PLACEMENT.
4. ALL REINFORCING DETAILS SHALL CONFORM TO "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES" ACI 315,
   LATEST EDITION, UNLESS DETAILED OTHERWISE ON THE STRUCTURAL DRAWINGS.
5. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL OPENINGS, SLEEVES, ANCHOR RODS, INSERTS, ETC., AS REQUIRED BEFORE CONCRETE IS PLACED.
6. WHERE BAR LENGTHS ARE GIVEN ON THE DRAWINGS, THE LENGTH OF ANY HOOK, IF REQUIRED, IS NOT INCLUDED.
7. CONTRACTOR SHALL PROVIDE SPACERS, CHAIRS, BOLSTERS, ETC., NECESSARY TO SUPPORT REINFORCING STEEL. CHAIRS WHICH BEAR ON EXPOSED
   CONCRETE SURFACES SHALL HAVE ENDS WHICH ARE PLASTIC TIPPED OR STAINLESS STEEL.
8. ALL STRUCTURAL MEMBERS SHALL BE POURED MONOLITHICALLY, EXCEPT FOR REQUIRED CONSTRUCTION JOINTS. CONTRACTOR SHALL SUBMIT
   PROPOSED CONSTRUCTION JOINT LOCATIONS AND DETAILS TO THE ENGINEER FOR REVIEW.
9. CONTRACTOR SHALL PROVIDE 3/4-INCH CHAMFER ON ALL EXPOSED CORNERS UNLESS OTHERWISE INDICATED ON THE DRAWINGS. MINIMUM
   CLEARANCES FOR REINFORCING STEEL SHALL BE MAINTAINED AS SPECIFIED BY ACI.
10. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT:
   3" ..... CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH
   2" ..... CONCRETE EXPOSED TO EARTH OR WEATHER, #6 THROUGH #18 BARS.
   1-1/2" ..... CONCRETE EXPOSED TO EARTH OR WEATHER, #5 BAR AND SMALLER.
11. FOOTING BARS SHALL BE BENT 1'-6" AROUND CORNERS, OR PROVIDE CORNER BARS WITH A 2'-0" LAP ON EACH LEG.
12. TESTING LABORATORY SHALL SUBMIT ONE COPY OF ALL CONCRETE TEST REPORTS DIRECTLY TO THE ENGINEER.
13. CONTRACTOR SHALL KEEP A COPY OF "FIELD REFERENCE MANUAL" (ACI PUBLICATION SP-15, LATEST EDITION) AT THE PROJECT FIELD OFFICE.
   FLY ASH SHALL BE PERMITTED. FLY ASH CONTENT SHALL BE A MAXIMUM OF 25% OF CEMENT WEIGHT

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

I. TOUCH UP OF GALVANIZING - (NOT REQUIRED)

J. HOT DIP GALVANIZING - (NOT REQUIRED)

K. PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER

1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY THE OWNER, THE OWNER WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.
2. THE MONOPOLE REINFORCING SYSTEM INDICATED IN THESE DOCUMENTS USES REINFORCING COMPONENTS THAT INVOLVE FIELD WELDING STEEL MEMBERS TO THE EXISTING GALVANIZED STEEL POLE STRUCTURE. THESE FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. **ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE CONNECTED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT THE OWNER REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.**
3. THE OWNER SHALL REFER TO TIA/EIA-222-F-1996, SECTION 14 AND ANNEX E FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY THE OWNER BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. **PAUL J. FORD & COMPANY RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT.** ACCORDING TO TIA/EIA-222-F-1996 SECTION 14.1, NOTE 1: "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

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37513-1642 PERMIT.DWG

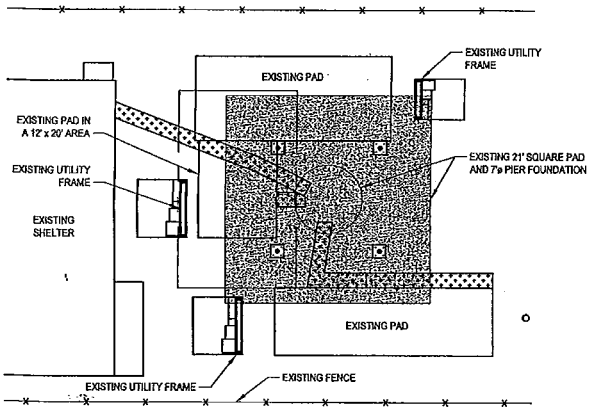
POLE SPECIFICATIONS	
POLE SHAPE TYPE:	18-SIDED POLYGON
TAPER:	0.244408 IN/FT
SHAFT STEEL:	ASTM A572 GRADE 65
BASE PL STEEL:	ASTM A572 GRADE 50
ANCHOR RODS:	1 1/4"ø ASTM A36

SHAFT SECTION DATA					
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN) @ TOP	DIAMETER ACROSS FLATS (IN) @ BOTTOM
1	17.00	0.2500	35.40	21.830	26.000
2	37.50	0.3125	46.20	24.776	34.063
3	37.50	0.3750	56.40	32.484	41.750
4	37.50	0.3750	66.00	39.639	49.063
5	37.50	0.3750		48.960	56.125

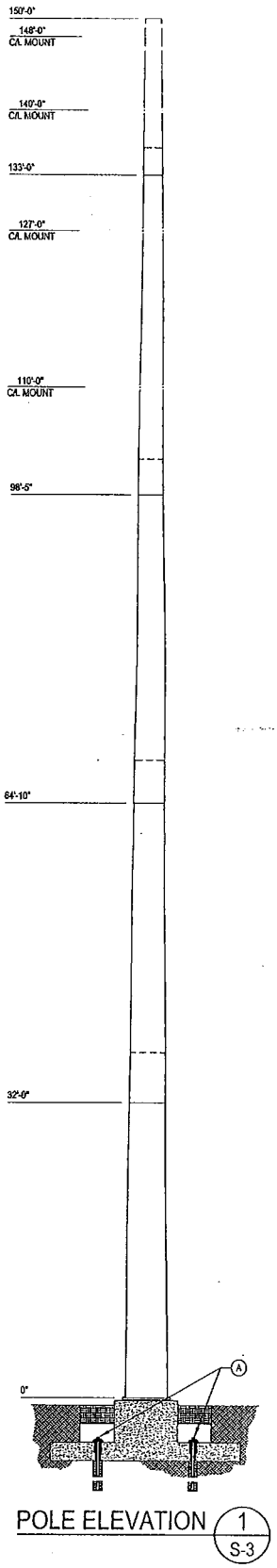
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

MODIFICATIONS:

(A) INSTALL (4) NEW MICROPILES IN EXISTING FOUNDATION. SEE SHEET S-4 & S-5.



PARTIAL SITE MAP 2 / S-3



POLE ELEVATION 1 / S-3

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

AUG 2 1 2013

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

CROWN CASTLE
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PH: (585) 899-3445 FAX: (585) 899-3448

BU #826222; NEWTOWN/RT-25
NEWTOWN, CT
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT No: 37513-1642	ISSUE DATE OF PERMIT: 8-20-2013
DRAWN BY: B.M.S.	
CHECKED BY: K.A.T.	
APPROVED BY: RH	S-3
DATE: 8-20-2013	

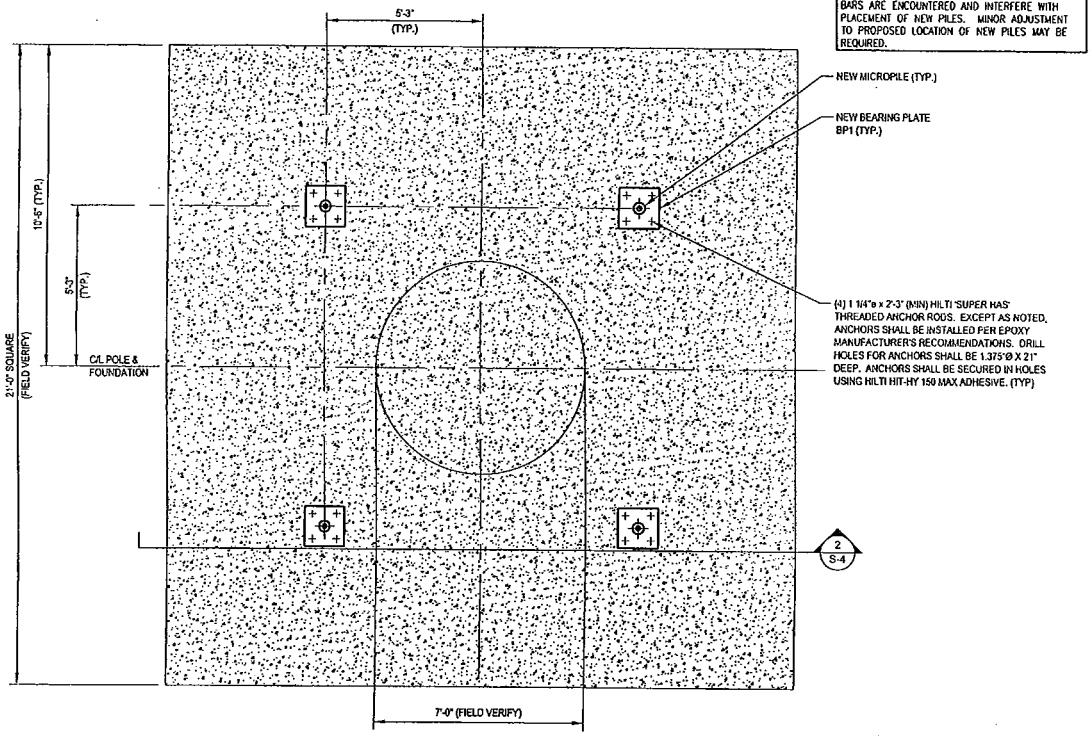
37513-1642 PERMIT.DWG

MICROPILE TESTING REQUIREMENTS

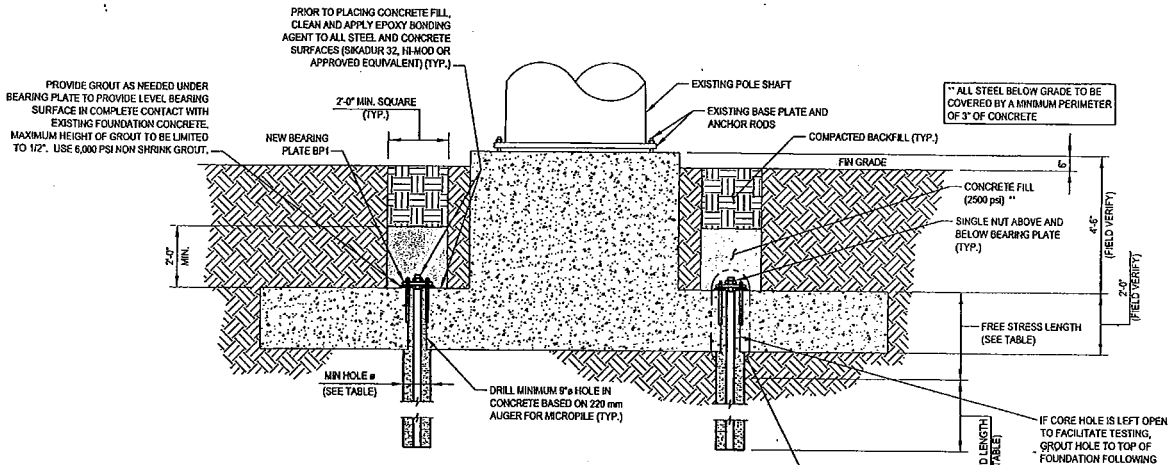
A MINIMUM OF 2 IN-PLACE MICROPILES (TEST PILES SHALL BE IN OPPOSITE CORNERS) ARE TO BE TESTED TO 208k IN TENSION. ALL PILE TESTING SHALL BE CARRIED OUT IN GENERAL CONFORMANCE WITH ASTM D3689. A HYDRAULIC JACK MAY BE SUBSTITUTED FOR THE PILE TESTING SET-UPS SHOWN IN THE ASTM SPECS. IF A HYDRAULIC JACK IS USED, FOLLOW EQUIPMENT GUIDELINES DISCUSSED IN THE POST TENSIONING INSTITUTE "RECOMMENDATIONS FOR PRESTRESSED ROCK AND SOIL ANCHORS" DESIGN GUIDE, SECTION 8.2. PILES SHALL BE LOADED USING PTI'S PROOF TEST METHODOLOGY (REFER TO SECTION 8.3.3 OF THE PTI DESIGN GUIDE; ALIGNMENT LOAD, AL, SHALL BE 16 KIPS; DESIGN LOAD, DL, IS 158 KIPS). PROVISION SHALL BE MADE TO ALLOW FOR MOVEMENT BETWEEN MICROPILE CROSS-SECTION AND SOIL SO THAT GROUT-TO-SOIL BOND LINE IS ADEQUATELY TESTED.

CONTECH'S 73/53 HOLLOW BAR MICROPILE OR EQUIVALENT SYSTEM.

TAKE ALL MEASURES NECESSARY TO AVOID DAMAGING EXISTING REINFORCING BARS DURING DRILLING OPERATIONS. NOTIFY PAUL J. FORD AND COMPANY IMMEDIATELY IF EXISTING REINFORCING BARS ARE ENCOUNTERED AND INTERFERE WITH PLACEMENT OF NEW PILES. MINOR ADJUSTMENT TO PROPOSED LOCATION OF NEW PILES MAY BE REQUIRED.



A FOUNDATION REINFORCING PLAN 1 S-4



A FOUNDATION REINFORCING 2 S-4

STATE OF CONNECTICUT
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AUG 2 1 2013

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CHECKED BY: K.A.T.	
APPROVED BY: KH	S-4
DATE: 8-20-2013	

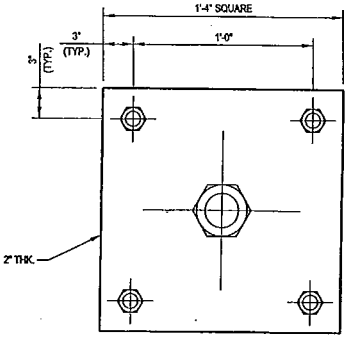
MICROPILE NOTES:

1. ALL HOLLOW BAR STEEL AND ASSOCIATED HARDWARE SHALL BE SUPPLIED BY CON-TECH SYSTEMS OR OWNER/EOR APPROVED EQUIVALENT.
2. ALL HOLLOW BAR, NUTS AND BEARING PLATES SHALL BE HOT-DIP GALVANIZED PER ASTM A123 OR A153, AS APPROPRIATE.
3. CONTACT CON-TECH SYSTEMS (OR MANUFACTURER OF APPROVED ALTERNATE) FOR MATERIALS AND INSTALLATION PROCEDURES AND RECOMMENDATIONS.
4. SPECIAL INSPECTION OF THE MICROPILES IS REQUIRED AS FOLLOWS: (1) VERIFY THAT MICROPILE MATERIAL, SIZE AND LENGTH COMPLY WITH THE INFORMATION SHOWN ON THIS DRAWING, (2) VERIFY PLACEMENT OF EACH MICROPILE, (3) OBSERVE DRILLING, GROUTING AND TESTING (AS APPROPRIATE) OPERATIONS FOR EACH MICROPILE AND MAINTAIN COMPLETE AND ACCURATE RECORDS FOR EACH MICROPILE.
5. FOUNDATION DESIGN IS BASED ON THE GEOTECHNICAL REPORT PREPARED BY FDH, PROJECT NO. 1305751600, DATED 8/15/13.
6. CONTACT CONTECH SYSTEMS (OR MANUFACTURER OF APPROVED ALTERNATE) TO VERIFY NUT & WASHER CONNECTION ARE COMPATIBLE WITH MICROPILE THREADS.
7. ALL MICROPILE SHALL BE GROUTED FOR FULL HEIGHT. GROUT TO BE 4,000 PSI MIN COMPRESSION STRENGTH WITH 0.5 (MAXIMUM WATER/CEMENT) W/C RATIO (TO BE COLLOIDALLY MIXED FOR MICROPILE).

PRELIMINARY PILE DESIGN PARAMETER SCHEDULE*

PARAMETER / OPTIONS	MIN. HOLE ø/STEEL AREA	ALLOWABLE PILE CAPACITY (kips)	ULTIMATE SKIN FRICTION (PSI)	FREE STRESS LENGTH	FRICTION DEVELOPMENT LENGTH/BOND LENGTH	ROCK SOCKET/ PLUNGE LENGTH	TOTAL EMBEDMENT LENGTH
MICROPILE	10.5"ø / 2.53 IN² MIN.	156K	SEE GEOTECH REPORT	5'	27' MIN.	N.A.	33' MIN.

* THE FINAL DESIGN GROUT DIAMETER IS BASED ON A MINIMUM 220MM AUGER IN SILTY SAND. THE DESIGN REQUIRES UNCASED MICROPILES FOR THE LISTED CAPACITY IN TENSION AND COMPRESSION AS LAID OUT PER PLAN. THE CONTRACTOR/MICROPILE INSTALLER IS RESPONSIBLE FOR THE MEANS AND METHODS TO ENSURE THE NECESSARY CAPACITY AND WILL DEMONSTRATE THE INSTALLED CAPACITY PER THE SPECIFIED TESTING. THE EMBEDMENT DEPTH AND AUGER/GROUT DIAMETERS ARE LISTED AS A PRELIMINARY BASIS FOR BIDDING. THE INTENT IS FOR THE INSTALLER TO REVIEW THE CURRENT SOIL INFORMATION AND DESIGN REQUIREMENTS TO ENSURE THAT THE CONTRACTOR'S SPECIFIC EQUIPMENT OR INSTALLATION TECHNIQUE IS APPROPRIATE. IF THE CONTRACTOR BELIEVES THE SCOPE SHOULD CHANGE UPON REVIEW, PLEASE ADDRESS PRIOR TO BIDDING. AS REQUIRED, PLEASE COORDINATE WITH ENGINEER OF RECORD PRIOR TO INSTALLATION.



NEW BEARING PLATE MK~BP1
(Fy=60 KSI) (TYP. 4 LOCATIONS)

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MODIFICATION INSPECTION NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

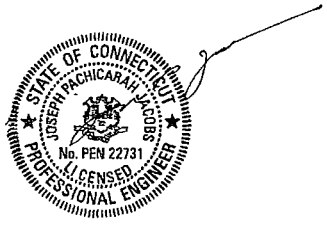
- PRE-CONSTRUCTION GENERAL SITE CONDITION
- PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION AND TORQUE
  - FINAL INSTALLED CONDITION
  -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

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

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

MI CHECKLIST	
CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
PRE-CONSTRUCTION	
X	MI CHECKLIST DRAWINGS
X	EOR APPROVED SHOP DRAWINGS
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS: PRIOR TO CONSTRUCTION, CONTRACTOR SHALL SUBMIT PILE INSTALLATION AND TESTING PLAN TO CROWN AND PJF FOR REVIEW . TESTING PLAN SHALL INCLUDE DETAILS REGARDING HOW CONTRACTOR INTENDS TO PREVENT INTERACTION BETWEEN THE TEST PILE AND THE EXISTING FOUNDATION DURING TESTING.	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
X	FOUNDATION INSPECTIONS
X	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
NA	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK LIFT AND DENSITY
NA	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	THIRD PARTY ONSITE INSPECTION OF BOLT PRETENSION PER CROWN REQUIREMENTS
NA	INSPECTION OF AJAX BOLTS AND DTIS PER REQUIREMENTS ON SHEET S-3
ADDITIONAL TESTING AND INSPECTIONS: VERIFY MICROPILE INSTALLATION DETAILS, SPECIFICALLY MICROPILE SIZES, DRILL HOLE DIAMETERS & DEPTHS, GROUT f'c AND THAT INSTALLATION WAS PER MANUFACTURER RECOMMENDATION	
POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	THIRD PARTY ONSITE BOLT INSPECTION REPORT
NA	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS: PROVIDE REPORT DOCUMENTING RESULTS OF MICROPILE INSTALLATION AND PROOF TESTING	

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



AUG 2 1 2013

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APPROVED BY:	S-6
DATE: 8-20-2013	

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

February 27, 2014

The Honorable Patricia E. Llodra
First Selectman
Town of Newtown
Town Hall
3 Primrose Street
Newtown, CT 06470-5307

RE: **EM-VER-097-140224** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 201 South Main Street, Newtown, Connecticut.

Dear First Selectman Llodra:

The Connecticut Siting Council (Council) received a request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72, a copy of which has already been provided to you.

If you have any questions or comments regarding the proposal, please call me or inform the Council by March 13, 2014.

Thank you for your cooperation and consideration.

Very truly yours,

Melanie Bachman
Acting Executive Director

MB/jb

c: Gary Frenette, Zoning Enforcement Officer, Town of Newtown

ROBINSON & COLE

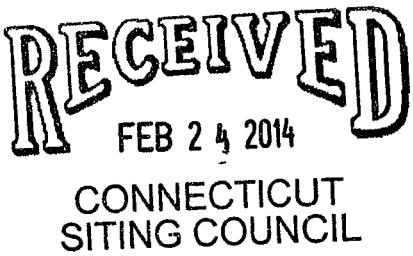
EM-VER-097-140224

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

February 21, 2014



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

Re: **Notice of Exempt Modification – Facility Modification**
201 South Main Street, Newtown, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 127-foot level of the existing 150-foot tower at 201 South Main Street in Newtown, Connecticut (the "Property"). The tower is owned by Crown Castle. The Council approved Cellco's use of the existing tower in 2002. Cellco now intends to modify its facility by adding three (3) model 742 213V01, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 127-foot level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable attached to the outside of the tower. Included in Attachment 1 are specifications for Cellco's additional antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to E. Patricia Llodra, First Selectwoman for the Town of Newtown. A copy of this letter is also being sent to Bluelinx Corp., the owner of the Property.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. The new antennas and RRHs will be located at the 127-foot level on the 150-foot tower.

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

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

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative worst-case RF emissions calculation for Cellco's modified facility is included in Attachment 2.

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

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

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
E. Patricia Llodra, Newtown First Selectwoman
Bluelinx Corp.
Sandy M. Carter

ATTACHMENT 1

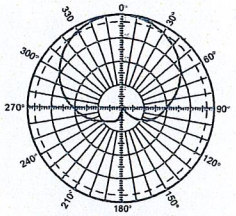
KATHREIN
SCALA DIVISION

742 213V01

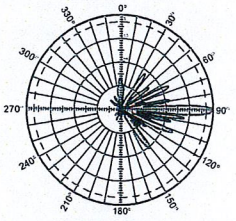
65° Panel Antenna

Kathrein's X-polarized adjustable electrical downtilt antennas offer the wireless carrier the ability to tailor polarization diversity sites for optimum performance. Using variable downtilt, only a few models need be procured to accommodate the needs of widely varying conditions. Remotely controlled downtilt is available as a retrofitable option.

- 0-6° downtilt range.
- UV resistant pulltruded fiberglass radome.
- DC Grounded metallic parts for impulse suppression.
- No moving electrical connections.
- Wideband vector dipole technology.
- Optional remote downtilt Control.
- Will accomodate future 3G / UMTS applications.



Horizontal pattern
±45°- polarization



Vertical pattern
±45°- polarization
0°–6° electrical downtilt

General specifications:

Frequency range	1710–2200 MHz
VSWR	< 1.5:1
Impedance	50 ohms
Intermodulation (2x20w)	IM3: <-150 dBc
Polarization	+45° and -45°
Front-to-back ratio (180°±30°)	>30 dB (co-polar) >25 dB (total power)
Maximum input power	300 watts per input (at 50°C)
Electrical downtilt continuously adjustable	0–6 degrees
Connector	2 x 7-16 DIN female
Isolation	>30 dB
Cross polar ratio Main direction 0° Sector ±60°	 25 dB (typical) >10 dB
Tracking, average	0.5 dB
Squint	±2.0°
Weight	19.8 lb (9 kg) 24.3 lb (11 kg) clamps included
Dimensions	76.9 x 6.1 x 2.8 inches (1954 x 155 x 70 mm)
Wind load Front/Side/Rear Mounting category	at 93 mph (150kph) 115 lbf / 32 lbf / 115 lbf (510 N) / (140 N) / (510 N) M (Medium)
Wind survival rating*	120 mph (200 kph)
Shipping dimensions	88 x 6.8 x 3.6 inches (2235 x 172 x 92 mm)
Shipping weight	28.7 lb (13 kg)
Mounting	Fixed mounts for 2 to 4.6 inch (50 to 115 mm) OD masts are included and tilt options are available.

See reverse for order information.

Specifications:	**1710–1880 MHz**	**1850–1990 MHz**	**1920–2200 MHz**
Gain	19 dBi	19.2 dBi	19.5 dBi
+45° and -45° polarization horizontal beamwidth	67° (half-power)	65° (half-power)	63° (half-power)
+45° and -45° polarization vertical beamwidth	4.7° (half-power)	4.5° (half-power)	4.3° (half-power)
Sidelobe suppression for first sidelobe above main beam	0° 2° 4° 6° T 18 18 16 15 dB	0° 2° 4° 6° T 18 18 17 16 dB	0° 2° 4° 6° T 18 18 18 18 dB

RoHS
Lead-Free

11271-B
936.3740/b

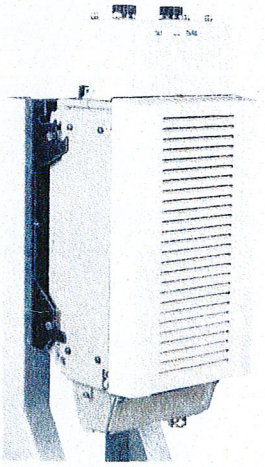
*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-AWS is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

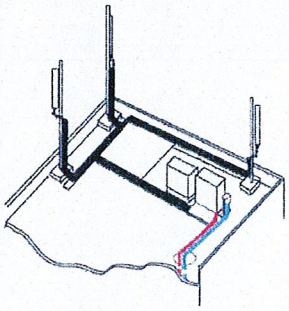
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-AWS provides more RF power while at the same time consuming less electricity.

Features

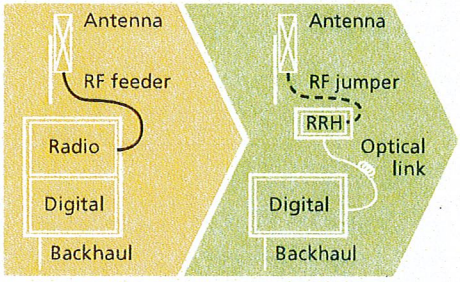
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

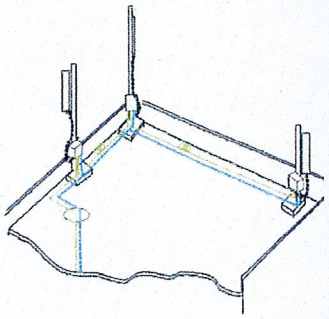
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170m (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)
- Enclosure protection
  - ¬ IP65 (International Protection rating)

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
  - ¬ TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
  - ¬ One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
  - ¬ Single mode dual fiber (SM/DF)
- Multi-mode variant
  - ¬ Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Digital Ports and Alarms

- Two optical ports to support daisy-chaining
- Six external alarms

CPG2809100912 (09)

Alcatel·Lucent

Product Data Sheet **HB158-1-08U8-S8J18**

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

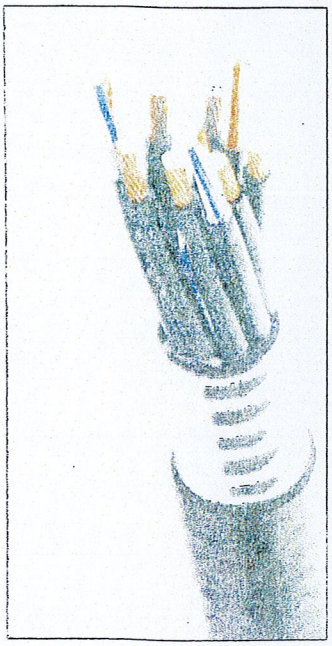


Figure 1: HYBRIFLEX Series

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design – Decreases tower loading
- Robust cabling – Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket – Ensures long-lasting cable protection

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	.068 (0.205)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

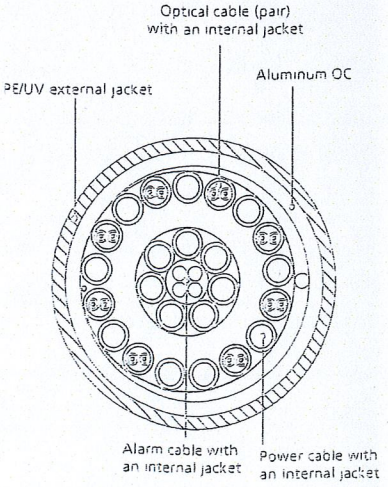


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Newtown S								
Tower Height: Verizon @ 127ft								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*AT&T UMTS	1	500	110	0.0149	880	0.5867	2.53%	
*AT&T UMTS	1	500	110	0.0149	1900	1.0000	1.49%	
*AT&T GSM	6	427	110	0.0761	1900	1.0000	7.61%	
*AT&T LTE	1	500	110	0.0149	740	0.4933	3.01%	
*VoiceStream	12	267.5	150	0.0513	1930	1.0000	5.13%	
*Sprint CDMA/LTE	2	693	137.4	0.0264	1900	1.0000	2.64%	
*Sprint CDMA/LTE	1	390	137.4	0.0074	850	0.5667	1.31%	
Verizon	**15**	**298**	**127**	**0.0997**	**1970**	**1.0000**	**9.97%**	
Verizon	**9**	**296**	**127**	**0.0594**	**869**	**0.5793**	**10.25%**	
Verizon	**1**	**1750**	**127**	**0.0390**	**2145**	**1.0000**	**3.90%**	
Verizon	**1**	**751**	**127**	**0.0167**	**698**	**0.4653**	**3.60%**	
								51.44%
* Source: Siting Council								

ATTACHMENT 3

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

Date: **January 15, 2014**

Patrick Byrum
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/a
	Carrier Site Name:	Newtown South CT
Crown Castle Designation:	**Crown Castle BU Number:**	826222
	Crown Castle Site Name:	Newtown/RT-25
	Crown Castle JDE Job Number:	255881
	Crown Castle Work Order Number:	698580
	Crown Castle Application Number:	211130 Rev. 0
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-1642
Site Data:	**201 Main Street, Newtown, Fairfield County, CT** **Latitude *41° 22' 41.322"*, Longitude *-73° 16' 26.843"*** **150 Foot - Monopole Tower**	

Dear Patrick Byrum,

Paul J Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 608781, in accordance with application 211130, revision 0.

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

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

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

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

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

Respectfully submitted by:

Jason C. Martin, E.I.
Structural Designer

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

tnxTower Report - version 6.1.4.1

JAN 15 2014

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 150 ft Monopole tower designed by Pirod Manufactures Inc. in October of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F. This analysis includes the modifications per the referenced proposed modifications by PJF dated 8/20/2013.

2) ANALYSIS CRITERIA

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

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
127.0	127.0	3	alcatel lucent	RRH2x40-AWS	1	1-5/8	1
		3	kathrein	742 213 w/ Mount Pipe			
		1	rfs celwave	DB-B1-6C-8AB-0Z			

Notes:
1) Proposed Equipment

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
148.0	150.0	1	andrew	HP4-102	25	1-5/8	1
	148.0	6	andrew	ETW190VS12UB			
		12	andrew	TMBXX-6516-R2M w/ Mount Pipe			
		1	tower mounts	Sector Mount [SM 411-3]			
140.0	137.0	3	alcatel lucent	1900MHz RRH	3	1-1/4	2
		3	alcatel lucent	800MHZ RRH			
		6	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
	140.0	6	decibel	DB980F90E-M w/ Mount Pipe	6	1-5/8	3
		3	decibel	DB980F90T2E-M w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 712-1]	--	--	1
127.0	127.0	1	antel	BXA-171063-12BF w/ Mount Pipe	12	1-5/8	1
		2	antel	BXA-171063/8CF w/ Mount Pipe			
		6	rfs celwave	APL866513-42T0 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		3	swedcom	SLCP 2x6014 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 304-1]			
110.0	110.0	6	ericsson	RRUS-11	1 2 6	3/4 7/8 1-1/4	1
		3	powerwave	7770.00 w/ Mount Pipe			
		6	powerwave	LGP21401			
		3	powerwave	P65-16-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 303-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed - Not Considered in this Analysis

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti Geotechnica Engineering, 10/16/2000	3536527	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Pirod, A-117711-F-1001206, 10/17/2000	3536528	CCISITES
PROPOSED MODIFICATION DRAWINGS	PJF, 37513-1642 BP, 8/20/2013	3963744	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Monopole will be reinforced in conformance with the reference modification drawings by PJF dated 8/20/2013.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	150 - 133	Pole	TP26x21.83x0.25	1	-4.20	1032.38	15.3	Pass
L2	133 - 98.45	Pole	TP34.0625x24.7764x0.3125	2	-12.30	1691.15	56.4	Pass
L3	98.45 - 64.8	Pole	TP41.75x32.4841x0.375	3	-19.15	2488.32	69.3	Pass
L4	64.8 - 32	Pole	TP49.0625x39.8387x0.375	4	-27.31	2928.95	80.4	Pass
L5	32 - 0	Pole	TP56.125x46.9597x0.375	5	-38.32	3394.28	87.9	Pass
							Summary	
						Pole (L5)	87.9	Pass
						RATING =	**87.9**	**Pass**

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

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	83.0	Pass
1	Base Plate	0	87.9	Pass
1	Base Foundation Structural Steel	0	99.1	Pass
1	Base Foundation Soil Interaction	0	19.0	Pass

Structure Rating (max from all components) =	**99.1%**

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

4.1) Recommendations

- Reinforce the monopole in conformance with the referenced proposed modification drawings by PJF dated 8/20/2013.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Fairfield County, Connecticut.
2) Basic wind speed of 85.00 mph.
3) Nominal ice thickness of 0.7500 in.
4) Ice thickness is considered to increase with height.
5) Ice density of 56.00 pcf.
6) A wind speed of 37.60 mph is used in combination with ice.
7) Deflections calculated using a wind speed of 50.00 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, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	150.0000-133.0000	17.0000	2.95	18	21.8300	26.0000	0.2500	1.0000	A572-65 (65 ksi)
L2	133.0000-98.4500	37.5000	3.85	18	24.7764	34.0625	0.3125	0.1250	A572-65 (65 ksi)
L3	98.4500-64.8000	37.5000	4.70	18	32.4841	41.7500	0.3750	1.5000	A572-65 (65 ksi)
L4	64.8000-32.0000	37.5000	5.50	18	39.8387	49.0625	0.3750	0.1875	A572-65 (65 ksi)
L5	32.0000-0.0000	37.5000		18	46.9597	56.1250	0.3750	0.1875	A572-65 (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	22.1668	17.1237	1007.4853	7.6609	11.0896	90.8492	2016.2962	8.5635	3.4021	13.608
	26.4011	20.4326	1711.6544	9.1412	13.2080	129.5922	3425.5610	10.2183	4.1360	16.544
L2	25.9004	24.2651	1834.7231	8.6847	12.5864	145.7703	3671.8604	12.1349	4.2066	13.461
	34.5880	33.4758	4817.4335	11.9812	17.3038	278.4040	9641.2058	16.7411	5.8410	18.691
L3	33.9512	38.2179	4978.0707	11.3987	16.5019	301.6659	9962.6917	19.1126	5.0572	13.486
	42.3941	49.2466	10650.9822	14.6881	21.2090	502.1916	21315.9793	24.6280	6.6880	17.835
L4	41.6271	46.9716	9242.0494	14.0096	20.2380	456.6670	18496.2597	23.4903	6.8136	18.17
	49.8194	57.9503	17355.1378	17.2841	24.9238	696.3293	34733.1119	28.9807	8.4370	22.499
L5	49.0491	55.4474	15202.1420	16.5376	23.8555	637.2590	30424.2873	27.7290	8.0669	21.512
	56.9908	66.3564	26056.1506	19.7913	28.5115	913.8821	52146.5865	33.1845	9.6800	25.813

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 150.0000-133.0000				1	1	1		
L2 133.0000-98.4500				1	1	1		
L3 98.4500-64.8000				1	1	1		
L4 64.8000-32.0000				1	1	1		
L5 32.0000-0.0000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***										

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
LDF7-50A(1-5/8")	C	No	Inside Pole	148.0000 - 0.0000	25	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
***								
HB114-1-0813U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	140.0000 - 127.0000	1	No Ice	0.1540	1.20
						1/2" Ice	0.2540	2.45
						1" Ice	0.3540	4.30
						2" Ice	0.5540	9.85
						4" Ice	0.9540	28.27
HB114-1-0813U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	140.0000 - 127.0000	2	No Ice	0.0000	1.20
						1/2" Ice	0.0000	2.45
						1" Ice	0.0000	4.30
						2" Ice	0.0000	9.85

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						4" Ice	0.0000	28.27
HB114-1-0813U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	3	No Ice	0.0000	1.20
						1/2" Ice	0.0000	2.45
						1" Ice	0.0000	4.30
						2" Ice	0.0000	9.85
						4" Ice	0.0000	28.27
***								
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	1	No Ice	0.0000	1.30
						1/2" Ice	0.0000	2.81
						1" Ice	0.0000	4.94
						2" Ice	0.0000	11.02
						4" Ice	0.0000	30.52
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	2	No Ice	0.1980	0.82
						1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
						2" Ice	0.5980	10.54
						4" Ice	0.9980	30.04
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	10	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
***								
9776(3/4")	C	No	Inside Pole	110.0000 - 0.0000	1	No Ice	0.0000	0.31
						1/2" Ice	0.0000	0.31
						1" Ice	0.0000	0.31
						2" Ice	0.0000	0.31
						4" Ice	0.0000	0.31
LDF5-50A(7/8")	C	No	Inside Pole	110.0000 - 0.0000	2	No Ice	0.0000	0.33
						1/2" Ice	0.0000	0.33
						1" Ice	0.0000	0.33
						2" Ice	0.0000	0.33
						4" Ice	0.0000	0.33
LDF6-50A(1-1/4")	C	No	Inside Pole	110.0000 - 0.0000	6	No Ice	0.0000	0.66
						1/2" Ice	0.0000	0.66
						1" Ice	0.0000	0.66
						2" Ice	0.0000	0.66
						4" Ice	0.0000	0.66
***								

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	150.0000-133.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.078	0.33
L2	133.0000-98.4500	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	12.230	1.21
L3	98.4500-64.8000	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	13.325	1.35
L4	64.8000-32.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	12.989	1.32
L5	32.0000-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	12.672	1.29

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	150.0000-133.0000	A	0.893	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.328	0.39
L2	133.0000-98.4500	A	0.871	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	23.499	2.67
L3	98.4500-64.8000	A	0.836	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	25.053	2.97
L4	64.8000-32.0000	A	0.785	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	23.953	2.82
L5	32.0000-0.0000	A	0.750	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	22.721	2.64

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.0000-133.0000	-0.0839	0.0485	-0.1636	0.0944
L2	133.0000-98.4500	-0.4081	0.2356	-0.6708	0.3873
L3	98.4500-64.8000	-0.4567	0.2637	-0.7532	0.4349
L4	64.8000-32.0000	-0.4653	0.2686	-0.7702	0.4447
L5	32.0000-0.0000	-0.4715	0.2722	-0.7730	0.4463

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(4) TMBXX-6516-R2M w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	148.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1758 6.6547 7.1374 8.1341 10.2560	4.5251 5.2049 5.8987 7.3732 10.5560	0.05 0.10 0.16 0.29 0.67
(4) TMBXX-6516-R2M w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	148.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1758 6.6547 7.1374 8.1341 10.2560	4.5251 5.2049 5.8987 7.3732 10.5560	0.05 0.10 0.16 0.29 0.67
(4) TMBXX-6516-R2M w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	148.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1758 6.6547 7.1374 8.1341 10.2560	4.5251 5.2049 5.8987 7.3732 10.5560	0.05 0.10 0.16 0.29 0.67
(2) ETW190VS12UB	A	From Face	4.0000 0.00 0.00	0.0000	148.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.6644 0.7783 0.9008 1.1717 1.8173	0.3669 0.4613 0.5644 0.7964 1.3642	0.01 0.02 0.03 0.04 0.11

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) ETW190VS12UB	B	From Face	4.0000 0.00	0.0000	148.0000	No Ice	0.6644	0.3669	0.01
			0.00			1/2" Ice	0.7783	0.4613	0.02
						1" Ice	0.9008	0.5644	0.03
						2" Ice	1.1717	0.7964	0.04
						4" Ice	1.8173	1.3642	0.11
(2) ETW190VS12UB	C	From Face	4.0000 0.00	0.0000	148.0000	No Ice	0.6644	0.3669	0.01
			0.00			1/2" Ice	0.7783	0.4613	0.02
						1" Ice	0.9008	0.5644	0.03
						2" Ice	1.1717	0.7964	0.04
						4" Ice	1.8173	1.3642	0.11
Sector Mount [SM 411-3]	C	None		0.0000	148.0000	No Ice	21.8800	21.8800	1.07
						1/2" Ice	30.6800	30.6800	1.48
						1" Ice	39.4800	39.4800	1.90
						2" Ice	57.0800	57.0800	2.73
						4" Ice	92.2800	92.2800	4.40
***									
(2) APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.0000 0.00	0.0000	140.0000	No Ice	8.4975	6.9458	0.08
			-3.00			1/2" Ice	9.1490	8.1266	0.15
						1" Ice	9.7672	9.0212	0.23
						2" Ice	11.0311	10.8440	0.41
						4" Ice	13.6786	14.8507	0.91
(2) APXVSPP18-C-A20 w/ Mount Pipe	B	From Face	4.0000 0.00	0.0000	140.0000	No Ice	8.4975	6.9458	0.08
			-3.00			1/2" Ice	9.1490	8.1266	0.15
						1" Ice	9.7672	9.0212	0.23
						2" Ice	11.0311	10.8440	0.41
						4" Ice	13.6786	14.8507	0.91
(2) APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.0000 0.00	0.0000	140.0000	No Ice	8.4975	6.9458	0.08
			-3.00			1/2" Ice	9.1490	8.1266	0.15
						1" Ice	9.7672	9.0212	0.23
						2" Ice	11.0311	10.8440	0.41
						4" Ice	13.6786	14.8507	0.91
1900MHz RRH	A	From Face	4.0000 0.00	0.0000	140.0000	No Ice	2.9069	3.8014	0.04
			-3.00			1/2" Ice	3.1446	4.0650	0.08
						1" Ice	3.3909	4.3372	0.11
						2" Ice	3.9094	4.9076	0.19
						4" Ice	5.0502	6.1520	0.41
1900MHz RRH	B	From Face	4.0000 0.00	0.0000	140.0000	No Ice	2.9069	3.8014	0.04
			-3.00			1/2" Ice	3.1446	4.0650	0.08
						1" Ice	3.3909	4.3372	0.11
						2" Ice	3.9094	4.9076	0.19
						4" Ice	5.0502	6.1520	0.41
1900MHz RRH	C	From Face	4.0000 0.00	0.0000	140.0000	No Ice	2.9069	3.8014	0.04
			-3.00			1/2" Ice	3.1446	4.0650	0.08
						1" Ice	3.3909	4.3372	0.11
						2" Ice	3.9094	4.9076	0.19
						4" Ice	5.0502	6.1520	0.41
800MHZ RRH	A	From Face	4.0000 0.00	0.0000	140.0000	No Ice	2.4899	2.0685	0.05
			-3.00			1/2" Ice	2.7061	2.2705	0.07
						1" Ice	2.9310	2.4812	0.10
						2" Ice	3.4068	2.9284	0.16
						4" Ice	4.4620	3.9265	0.32
800MHZ RRH	B	From Face	4.0000 0.00	0.0000	140.0000	No Ice	2.4899	2.0685	0.05
			-3.00			1/2" Ice	2.7061	2.2705	0.07
						1" Ice	2.9310	2.4812	0.10
						2" Ice	3.4068	2.9284	0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	4.4620	3.9265	0.32
						4" Ice			
800MHZ RRH	C	From Face	4.0000 0.00 -3.00	0.0000	140.0000	No Ice	2.4899	2.0685	0.05
						1/2" Ice	2.7061	2.2705	0.07
						1" Ice	2.9310	2.4812	0.10
						2" Ice	3.4068	2.9284	0.16
						4" Ice	4.4620	3.9265	0.32
Platform Mount [LP 712-1]	C	None		0.0000	140.0000	No Ice	24.5300	24.5300	1.34
						1/2" Ice	29.9400	29.9400	1.65
						1" Ice	35.3500	35.3500	1.96
						2" Ice	46.1700	46.1700	2.58
						4" Ice	67.8100	67.8100	3.82
***									
742 213 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	127.0000	No Ice	5.3729	4.6203	0.05
						1/2" Ice	5.9502	6.0004	0.09
						1" Ice	6.5014	6.9816	0.15
						2" Ice	7.6106	8.8524	0.28
						4" Ice	9.9329	12.7940	0.68
742 213 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	127.0000	No Ice	5.3729	4.6203	0.05
						1/2" Ice	5.9502	6.0004	0.09
						1" Ice	6.5014	6.9816	0.15
						2" Ice	7.6106	8.8524	0.28
						4" Ice	9.9329	12.7940	0.68
742 213 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	127.0000	No Ice	5.3729	4.6203	0.05
						1/2" Ice	5.9502	6.0004	0.09
						1" Ice	6.5014	6.9816	0.15
						2" Ice	7.6106	8.8524	0.28
						4" Ice	9.9329	12.7940	0.68
RRH2x40-AWS	A	From Leg	4.0000 0.00 0.00	0.0000	127.0000	No Ice	2.9764	1.5960	0.04
						1/2" Ice	3.2363	1.8239	0.06
						1" Ice	3.5048	2.0605	0.08
						2" Ice	4.0678	2.5596	0.14
						4" Ice	5.2975	3.6614	0.29
RRH2x40-AWS	B	From Leg	4.0000 0.00 0.00	0.0000	127.0000	No Ice	2.9764	1.5960	0.04
						1/2" Ice	3.2363	1.8239	0.06
						1" Ice	3.5048	2.0605	0.08
						2" Ice	4.0678	2.5596	0.14
						4" Ice	5.2975	3.6614	0.29
RRH2x40-AWS	C	From Leg	4.0000 0.00 0.00	0.0000	127.0000	No Ice	2.9764	1.5960	0.04
						1/2" Ice	3.2363	1.8239	0.06
						1" Ice	3.5048	2.0605	0.08
						2" Ice	4.0678	2.5596	0.14
						4" Ice	5.2975	3.6614	0.29
DB-B1-6C-8AB-0Z	C	From Leg	4.0000 0.00 0.00	0.0000	127.0000	No Ice	5.6000	2.3333	0.04
						1/2" Ice	5.9154	2.5580	0.08
						1" Ice	6.2395	2.7914	0.12
						2" Ice	6.9136	3.2839	0.21
						4" Ice	8.3654	4.3728	0.45
(2) APL866513-42T0 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	127.0000	No Ice	4.5308	4.9208	0.03
						1/2" Ice	4.9675	5.5962	0.08
						1" Ice	5.4135	6.2837	0.13
						2" Ice	6.3370	7.7123	0.25
						4" Ice	8.3197	10.8330	0.60
(2) APL866513-42T0 w/ Mount Pipe	B	From Face	4.0000 0.00	0.0000	127.0000	No Ice	4.5308	4.9208	0.03
						1/2" Ice	4.9675	5.5962	0.08

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	5.4135	6.2837	0.13
						1" Ice	6.3370	7.7123	0.25
						2" Ice	8.3197	10.8330	0.60
						4" Ice			
(2) APL866513-42T0 w/ Mount Pipe	C	From Face	4.0000	0.0000	127.0000	No Ice	4.5308	4.9208	0.03
			0.00			1/2"	4.9675	5.5962	0.08
			0.00			Ice	5.4135	6.2837	0.13
						1" Ice	6.3370	7.7123	0.25
						2" Ice	8.3197	10.8330	0.60
						4" Ice			
(2) BXA-171063/8CF w/ Mount Pipe	A	From Face	4.0000	0.0000	127.0000	No Ice	3.1574	3.3303	0.03
			0.00			1/2"	3.5312	3.9423	0.06
			0.00			Ice	3.9415	4.5633	0.10
						1" Ice	4.8273	5.8553	0.19
						2" Ice	6.7342	8.8407	0.48
						4" Ice			
(2) SLCP 2x6014 w/ Mount Pipe	B	From Face	4.0000	0.0000	127.0000	No Ice	7.4514	6.9545	0.04
			0.00			1/2"	7.9606	7.7563	0.10
			0.00			Ice	8.4698	8.5195	0.18
						1" Ice	9.5191	10.0997	0.34
						2" Ice	11.7421	13.4750	0.80
						4" Ice			
SLCP 2x6014 w/ Mount Pipe	C	From Face	4.0000	0.0000	127.0000	No Ice	7.4514	6.9545	0.04
			0.00			1/2"	7.9606	7.7563	0.10
			0.00			Ice	8.4698	8.5195	0.18
						1" Ice	9.5191	10.0997	0.34
						2" Ice	11.7421	13.4750	0.80
						4" Ice			
BXA-171063-12BF w/ Mount Pipe	C	From Face	4.0000	0.0000	127.0000	No Ice	4.9710	5.2283	0.04
			0.00			1/2"	5.5211	6.3892	0.09
			0.00			Ice	6.0361	7.2610	0.14
						1" Ice	7.0911	9.0462	0.27
						2" Ice	9.3593	12.8165	0.67
						4" Ice			
(2) FD9R6004/2C-3L	A	From Face	4.0000	0.0000	127.0000	No Ice	0.3665	0.0846	0.00
			0.00			1/2"	0.4506	0.1362	0.01
			0.00			Ice	0.5433	0.1965	0.01
						1" Ice	0.7546	0.3430	0.02
						2" Ice	1.2808	0.7396	0.06
						4" Ice			
(2) FD9R6004/2C-3L	B	From Face	4.0000	0.0000	127.0000	No Ice	0.3665	0.0846	0.00
			0.00			1/2"	0.4506	0.1362	0.01
			0.00			Ice	0.5433	0.1965	0.01
						1" Ice	0.7546	0.3430	0.02
						2" Ice	1.2808	0.7396	0.06
						4" Ice			
(2) FD9R6004/2C-3L	C	From Face	4.0000	0.0000	127.0000	No Ice	0.3665	0.0846	0.00
			0.00			1/2"	0.4506	0.1362	0.01
			0.00			Ice	0.5433	0.1965	0.01
						1" Ice	0.7546	0.3430	0.02
						2" Ice	1.2808	0.7396	0.06
						4" Ice			
Platform Mount [LP 304-1]	C	None		0.0000	127.0000	No Ice	17.4600	17.4600	1.35
						1/2"	22.4400	22.4400	1.62
						Ice	27.4200	27.4200	1.90
						1" Ice	37.3800	37.3800	2.45
						2" Ice	57.3000	57.3000	3.55
						4" Ice			
***									
7770.00 w/ Mount Pipe	A	From Face	4.0000	0.0000	110.0000	No Ice	6.1194	4.2543	0.06
			0.00			1/2"	6.6258	5.0137	0.10
			0.00			Ice	7.1283	5.7109	0.16
						1" Ice	8.1643	7.1553	0.29
						2" Ice	10.3599	10.4117	0.66
						4" Ice			

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
7770.00 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.06 0.10 0.16 0.29 0.66
7770.00 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.06 0.10 0.16 0.29 0.66
(2) LGP21401	A	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	C	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.01 0.02 0.03 0.05 0.14
P65-16-XLH-RR w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6375 9.2903 9.9098 11.1763 13.8289	6.3625 7.5378 8.4270 10.2390 14.0988	0.08 0.14 0.22 0.39 0.89
P65-16-XLH-RR w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6375 9.2903 9.9098 11.1763 13.8289	6.3625 7.5378 8.4270 10.2390 14.0988	0.08 0.14 0.22 0.39 0.89
P65-16-XLH-RR w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6375 9.2903 9.9098 11.1763 13.8289	6.3625 7.5378 8.4270 10.2390 14.0988	0.08 0.14 0.22 0.39 0.89
(2) RRUS-11	A	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	B	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	C	From Face	4.0000 0.00 0.00	0.0000	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31

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
DC6-48-60-18-8F	A	From Face	4.0000	0.0000	0.0000	110.0000	4" Ice			
			0.00				No Ice	2.5667	2.5667	0.02
			0.00				1/2" Ice	2.7978	2.7978	0.04
							1" Ice	3.0377	3.0377	0.07
							2" Ice	3.5432	3.5432	0.13
							4" Ice	4.6580	4.6580	0.30
Platform Mount [LP 303-1]	C	None			0.0000	110.0000	No Ice	14.6600	14.6600	1.25
							1/2" Ice	18.8700	18.8700	1.48
							1" Ice	23.0800	23.0800	1.71
							2" Ice	31.5000	31.5000	2.18
							4" Ice	48.3400	48.3400	3.10
***										

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
HP4-102	C	Paraboloid w/Shroud (HP)	From Face	4.0000	0.0000	60.0000		148.0000	4.0000	No Ice	12.5700	0.08
				0.00						1/2" Ice	13.1000	0.15
				2.00						1" Ice	13.6200	0.21
										2" Ice	14.6800	0.35
										4" Ice	16.8000	0.62

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 150.0000-133.0000	141.2530	1.515	28.02	33.880	A	0.000	33.880	33.880	100.00	0.000	0.000
					B	0.000	33.880		100.00	0.000	0.000
					C	0.000	33.880		100.00	0.000	1.078
L2 133.0000-98.4500	115.0815	1.429	26.40	85.755	A	0.000	85.755	85.755	100.00	0.000	0.000
					B	0.000	85.755		100.00	0.000	0.000
					C	0.000	85.755		100.00	0.000	12.230
L3 98.4500-64.8000	81.2529	1.294	23.88	105.416	A	0.000	105.416	105.416	100.00	0.000	0.000
					B	0.000	105.416		100.00	0.000	0.000
					C	0.000	105.416		100.00	0.000	13.325
L4 64.8000-32.0000	48.3113	1.115	20.51	123.078	A	0.000	123.078	123.078	100.00	0.000	0.000
					B	0.000	123.078		100.00	0.000	0.000
					C	0.000	123.078		100.00	0.000	12.989
L5 32.0000-0.0000	15.6006	1	18.50	139.239	A	0.000	139.239	139.239	100.00	0.000	0.000
					B	0.000	139.239		100.00	0.000	0.000
					C	0.000	139.239		100.00	0.000	12.672

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-133.0000	141.2530	1.515	5.48	0.8930	36.410	A	0.000	36.410	36.410	100.00	0.000	0.000
						B	0.000	36.410		100.00	0.000	0.000
						C	0.000	36.410		100.00	0.000	2.328
L2 133.0000-98.4500	115.0815	1.429	5.17	0.8713	90.897	A	0.000	90.897	90.897	100.00	0.000	0.000
						B	0.000	90.897		100.00	0.000	0.000
						C	0.000	90.897		100.00	0.000	23.499
L3 98.4500-64.8000	81.2529	1.294	4.67	0.8356	110.303	A	0.000	110.303	110.303	100.00	0.000	0.000
						B	0.000	110.303		100.00	0.000	0.000
						C	0.000	110.303		100.00	0.000	25.053
L4 64.8000-32.0000	48.3113	1.115	4.01	0.7851	127.646	A	0.000	127.646	127.646	100.00	0.000	0.000
						B	0.000	127.646		100.00	0.000	0.000
						C	0.000	127.646		100.00	0.000	23.953
L5 32.0000-0.0000	15.6006	1	3.62	0.7500	143.426	A	0.000	143.426	143.426	100.00	0.000	0.000
						B	0.000	143.426		100.00	0.000	0.000
						C	0.000	143.426		100.00	0.000	22.721

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-133.0000	141.2530	1.515	9.70	33.880	A	0.000	33.880	33.880	100.00	0.000	0.000
					B	0.000	33.880		100.00	0.000	0.000
					C	0.000	33.880		100.00	0.000	1.078
L2 133.0000-98.4500	115.0815	1.429	9.14	85.755	A	0.000	85.755	85.755	100.00	0.000	0.000
					B	0.000	85.755		100.00	0.000	0.000
					C	0.000	85.755		100.00	0.000	12.230
L3 98.4500-64.8000	81.2529	1.294	8.26	105.416	A	0.000	105.416	105.416	100.00	0.000	0.000
					B	0.000	105.416		100.00	0.000	0.000
					C	0.000	105.416		100.00	0.000	13.325
L4 64.8000-32.0000	48.3113	1.115	7.10	123.078	A	0.000	123.078	123.078	100.00	0.000	0.000
					B	0.000	123.078		100.00	0.000	0.000
					C	0.000	123.078		100.00	0.000	12.989
L5 32.0000-0.0000	15.6006	1	6.40	139.239	A	0.000	139.239	139.239	100.00	0.000	0.000
					B	0.000	139.239		100.00	0.000	0.000
					C	0.000	139.239		100.00	0.000	12.672

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	24.82					
Bracing Weight	0.00					
Total Member Self-Weight	24.82			2.14	3.03	
Total Weight	38.33			2.14	3.03	
Wind 0 deg - No Ice		0.48	-30.85	-3221.98	-66.29	1.90
Wind 30 deg - No Ice		15.87	-26.84	-2807.09	-1672.82	3.24
Wind 60 deg - No Ice		27.08	-15.65	-1641.39	-2840.69	3.86
Wind 90 deg - No Ice		31.16	-0.34	-46.06	-3265.19	4.04
Wind 120 deg - No Ice		26.93	15.01	1554.16	-2820.84	3.57
Wind 150 deg - No Ice		15.28	26.62	2780.43	-1587.83	1.24

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 180 deg - No Ice		-0.33	30.82	3221.15	50.73	-0.92
Wind 210 deg - No Ice		-15.75	26.73	2795.23	1661.58	-2.40
Wind 240 deg - No Ice		-26.95	15.57	1634.50	2827.40	-3.22
Wind 270 deg - No Ice		-31.01	0.29	43.42	3248.63	-3.58
Wind 300 deg - No Ice		-26.83	-15.12	-1566.06	2811.67	-3.34
Wind 330 deg - No Ice		-15.39	-26.55	-2766.21	1611.11	-1.80
Member Ice	5.96					
Total Weight Ice	57.46			8.05	11.83	
Wind 0 deg - Ice		0.10	-7.38	-775.92	-2.58	0.30
Wind 30 deg - Ice		3.78	-6.41	-674.39	-393.67	0.64
Wind 60 deg - Ice		6.47	-3.73	-390.40	-678.29	0.83
Wind 90 deg - Ice		7.45	-0.07	-1.92	-781.91	0.93
Wind 120 deg - Ice		6.44	3.60	387.55	-674.29	0.86
Wind 150 deg - Ice		3.66	6.37	684.15	-376.09	0.38
Wind 180 deg - Ice		-0.07	7.37	790.93	21.69	-0.10
Wind 210 deg - Ice		-3.76	6.39	687.08	413.69	-0.46
Wind 240 deg - Ice		-6.44	3.72	404.14	697.88	-0.69
Wind 270 deg - Ice		-7.41	0.06	16.55	800.81	-0.83
Wind 300 deg - Ice		-6.42	-3.63	-374.86	694.75	-0.82
Wind 330 deg - Ice		-3.69	-6.36	-665.97	403.38	-0.50
Total Weight	38.33			2.14	3.03	
Wind 0 deg - Service		0.16	-10.68	-1115.12	-23.81	0.66
Wind 30 deg - Service		5.49	-9.29	-971.56	-579.70	1.12
Wind 60 deg - Service		9.37	-5.41	-568.20	-983.81	1.33
Wind 90 deg - Service		10.78	-0.12	-16.18	-1130.69	1.40
Wind 120 deg - Service		9.32	5.20	537.53	-976.94	1.24
Wind 150 deg - Service		5.29	9.21	961.84	-550.29	0.43
Wind 180 deg - Service		-0.11	10.66	1114.34	16.68	-0.32
Wind 210 deg - Service		-5.45	9.25	966.96	574.07	-0.83
Wind 240 deg - Service		-9.33	5.39	565.32	977.47	-1.11
Wind 270 deg - Service		-10.73	0.10	14.78	1123.22	-1.24
Wind 300 deg - Service		-9.28	-5.23	-542.14	972.03	-1.16
Wind 330 deg - Service		-5.33	-9.19	-957.41	556.61	-0.62

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

Comb. No.	Description
26	Dead+Wind 330 deg+Ice
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	150 - 133	Pole	Max Tension	8	0.00	0.00	0.00
			Max. Compression	14	-9.25	0.08	-1.03
			Max. Mx	5	-4.21	-78.31	3.32
			Max. My	8	-4.24	3.52	-75.02
			Max. Vy	5	10.39	-78.31	3.32
			Max. Vx	2	-10.16	-5.33	74.70
			Max. Torque	5			-3.36
L2	133 - 98.45	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-23.87	2.23	-2.56
			Max. Mx	5	-12.32	-628.87	13.70
			Max. My	2	-12.36	-20.54	615.60
			Max. Vy	5	21.91	-628.87	13.70
			Max. Vx	2	-21.60	-20.54	615.60
			Max. Torque	4			-4.38
L3	98.45 - 64.8	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33.39	5.12	-4.26
			Max. Mx	5	-19.17	-1399.94	24.75
			Max. My	2	-19.20	-36.30	1376.46
			Max. Vy	5	25.13	-1399.94	24.75
			Max. Vx	2	-24.81	-36.30	1376.46
			Max. Torque	5			-3.88
L4	64.8 - 32	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-44.15	8.35	-6.15
			Max. Mx	5	-27.31	-2251.61	35.42
			Max. My	2	-27.33	-51.40	2218.29
			Max. Vy	5	28.06	-2251.61	35.42
			Max. Vx	2	-27.74	-51.40	2218.29
			Max. Torque	5			-3.94
L5	32 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-58.19	12.34	-8.45
			Max. Mx	5	-38.32	-3361.70	47.63
			Max. My	2	-38.32	-68.55	3317.14
			Max. Vy	5	31.18	-3361.70	47.63
			Max. Vx	2	-30.87	-68.55	3317.14
			Max. Torque	5			-4.02

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	58.19	-0.00	0.00
	Max. H_x	11	38.33	31.01	-0.29
	Max. H_z	2	38.33	-0.48	30.85

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. M_x	2	3317.14	-0.48	30.85
	Max. M_z	5	3361.70	-31.16	0.34
	Max. Torsion	11	3.59	31.01	-0.29
	Min. Vert	8	38.33	0.33	-30.82
	Min. H_x	5	38.33	-31.16	0.34
	Min. H_z	8	38.33	0.33	-30.82
	Min. M_x	8	-3316.03	0.33	-30.82
	Min. M_z	11	-3344.59	31.01	-0.29
	Min. Torsion	5	-4.02	-31.16	0.34

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	38.33	0.00	-0.00	2.15	3.05	-0.00
Dead+Wind 0 deg - No Ice	38.33	0.48	-30.85	-3317.14	-68.55	1.91
Dead+Wind 30 deg - No Ice	38.33	15.87	-26.84	-2889.99	-1722.44	3.24
Dead+Wind 60 deg - No Ice	38.33	27.08	-15.65	-1689.94	-2924.68	3.85
Dead+Wind 90 deg - No Ice	38.33	31.16	-0.34	-47.63	-3361.70	4.02
Dead+Wind 120 deg - No Ice	38.33	26.93	15.01	1599.81	-2904.35	3.55
Dead+Wind 150 deg - No Ice	38.33	15.28	26.62	2862.59	-1634.69	1.25
Dead+Wind 180 deg - No Ice	38.33	-0.33	30.82	3316.03	52.43	-0.91
Dead+Wind 210 deg - No Ice	38.33	-15.75	26.73	2877.74	1710.83	-2.39
Dead+Wind 240 deg - No Ice	38.33	-26.95	15.57	1682.80	2910.97	-3.22
Dead+Wind 270 deg - No Ice	38.33	-31.01	0.29	44.86	3344.59	-3.59
Dead+Wind 300 deg - No Ice	38.33	-26.83	-15.12	-1612.15	2894.82	-3.35
Dead+Wind 330 deg - No Ice	38.33	-15.39	-26.55	-2847.89	1658.73	-1.80
Dead+Ice	58.19	0.00	-0.00	8.45	12.34	-0.00
Dead+Wind 0 deg+Ice	58.19	0.10	-7.38	-816.81	-2.84	0.31
Dead+Wind 30 deg+Ice	58.19	3.78	-6.41	-709.94	-414.55	0.65
Dead+Wind 60 deg+Ice	58.19	6.47	-3.73	-411.00	-714.17	0.84
Dead+Wind 90 deg+Ice	58.19	7.45	-0.07	-2.04	-823.26	0.94
Dead+Wind 120 deg+Ice	58.19	6.44	3.60	407.96	-709.95	0.88
Dead+Wind 150 deg+Ice	58.19	3.66	6.37	720.29	-395.92	0.39
Dead+Wind 180 deg+Ice	58.19	-0.07	7.37	832.72	22.90	-0.10
Dead+Wind 210 deg+Ice	58.19	-3.76	6.39	723.39	435.58	-0.47
Dead+Wind 240 deg+Ice	58.19	-6.44	3.72	425.55	734.74	-0.71
Dead+Wind 270 deg+Ice	58.19	-7.41	0.06	17.55	843.09	-0.85
Dead+Wind 300 deg+Ice	58.19	-6.42	-3.63	-394.52	731.43	-0.83
Dead+Wind 330 deg+Ice	58.19	-3.68	-6.35	-701.01	424.66	-0.51
Dead+Wind 0 deg - Service	38.33	0.16	-10.67	-1147.37	-21.70	0.66
Dead+Wind 30 deg - Service	38.33	5.49	-9.29	-999.52	-594.54	1.13
Dead+Wind 60 deg - Service	38.33	9.37	-5.41	-583.88	-1010.96	1.34
Dead+Wind 90 deg - Service	38.33	10.78	-0.12	-15.04	-1162.25	1.41
Dead+Wind 120 deg - Service	38.33	9.32	5.20	555.54	-1003.87	1.24
Dead+Wind 150 deg - Service	38.33	5.29	9.21	992.88	-564.11	0.43
Dead+Wind 180 deg - Service	38.33	-0.11	10.66	1149.97	20.21	-0.32
Dead+Wind 210 deg - Service	38.33	-5.45	9.25	998.17	594.60	-0.84
Dead+Wind 240 deg - Service	38.33	-9.33	5.39	584.30	1010.28	-1.12
Dead+Wind 270 deg - Service	38.33	-10.73	0.10	17.00	1160.39	-1.25
Dead+Wind 300 deg - Service	38.33	-9.28	-5.23	-556.90	1004.65	-1.17
Dead+Wind 330 deg - Service	38.33	-5.33	-9.19	-984.88	576.53	-0.63

Solution Summary

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Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-38.33	0.00	-0.00	38.33	0.00	0.000%
2	0.48	-38.33	-30.85	-0.48	38.33	30.85	0.001%
3	15.87	-38.33	-26.84	-15.87	38.33	26.84	0.000%
4	27.08	-38.33	-15.65	-27.08	38.33	15.65	0.000%
5	31.16	-38.33	-0.34	-31.16	38.33	0.34	0.001%
6	26.93	-38.33	15.01	-26.93	38.33	-15.01	0.000%
7	15.28	-38.33	26.62	-15.28	38.33	-26.62	0.000%
8	-0.33	-38.33	30.82	0.33	38.33	-30.82	0.005%
9	-15.75	-38.33	26.73	15.75	38.33	-26.73	0.000%
10	-26.95	-38.33	15.57	26.95	38.33	-15.57	0.000%
11	-31.01	-38.33	0.29	31.01	38.33	-0.29	0.001%
12	-26.83	-38.33	-15.12	26.83	38.33	15.12	0.000%
13	-15.39	-38.33	-26.55	15.39	38.33	26.55	0.000%
14	0.00	-58.19	0.00	-0.00	58.19	0.00	0.001%
15	0.10	-58.19	-7.38	-0.10	58.19	7.38	0.002%
16	3.78	-58.19	-6.41	-3.78	58.19	6.41	0.002%
17	6.47	-58.19	-3.73	-6.47	58.19	3.73	0.002%
18	7.45	-58.19	-0.07	-7.45	58.19	0.07	0.002%
19	6.44	-58.19	3.60	-6.44	58.19	-3.60	0.002%
20	3.66	-58.19	6.37	-3.66	58.19	-6.37	0.002%
21	-0.07	-58.19	7.37	0.07	58.19	-7.37	0.002%
22	-3.76	-58.19	6.39	3.76	58.19	-6.39	0.002%
23	-6.44	-58.19	3.72	6.44	58.19	-3.72	0.002%
24	-7.41	-58.19	0.06	7.41	58.19	-0.06	0.002%
25	-6.42	-58.19	-3.63	6.42	58.19	3.63	0.002%
26	-3.69	-58.19	-6.36	3.68	58.19	6.35	0.002%
27	0.16	-38.33	-10.68	-0.16	38.33	10.67	0.002%
28	5.49	-38.33	-9.29	-5.49	38.33	9.29	0.001%
29	9.37	-38.33	-5.41	-9.37	38.33	5.41	0.001%
30	10.78	-38.33	-0.12	-10.78	38.33	0.12	0.002%
31	9.32	-38.33	5.20	-9.32	38.33	-5.20	0.001%
32	5.29	-38.33	9.21	-5.29	38.33	-9.21	0.001%
33	-0.11	-38.33	10.66	0.11	38.33	-10.66	0.002%
34	-5.45	-38.33	9.25	5.45	38.33	-9.25	0.001%
35	-9.33	-38.33	5.39	9.33	38.33	-5.39	0.001%
36	-10.73	-38.33	0.10	10.73	38.33	-0.10	0.002%
37	-9.28	-38.33	-5.23	9.28	38.33	5.23	0.001%
38	-5.33	-38.33	-9.19	5.33	38.33	9.19	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	9	0.00000001	0.00007796
3	Yes	11	0.00000001	0.00007695
4	Yes	11	0.00000001	0.00006615
5	Yes	9	0.00000001	0.00006665
6	Yes	11	0.00000001	0.00007152
7	Yes	11	0.00000001	0.00006457
8	Yes	7	0.00005803	0.00010038
9	Yes	11	0.00000001	0.00006700
10	Yes	11	0.00000001	0.00007555
11	Yes	9	0.00000001	0.00009362
12	Yes	11	0.00000001	0.00006155
13	Yes	11	0.00000001	0.00006865
14	Yes	4	0.00000001	0.00000900
15	Yes	7	0.00013417	0.00004381
16	Yes	7	0.00013405	0.00013570
17	Yes	7	0.00013407	0.00008539
18	Yes	7	0.00013422	0.00006925
19	Yes	7	0.00013407	0.00013670
20	Yes	7	0.00013407	0.00008871
21	Yes	7	0.00013421	0.00003029

22	Yes	7	0.00013404	0.00009821
23	Yes	7	0.00013404	0.00014695
24	Yes	7	0.00013418	0.00007035
25	Yes	7	0.00013403	0.00007969
26	Yes	7	0.00013401	0.00011514
27	Yes	7	0.00000001	0.00008086
28	Yes	8	0.00000001	0.00010232
29	Yes	8	0.00000001	0.00006852
30	Yes	7	0.00000001	0.00010553
31	Yes	8	0.00000001	0.00009604
32	Yes	8	0.00000001	0.00006906
33	Yes	7	0.00000001	0.00004440
34	Yes	8	0.00000001	0.00007087
35	Yes	8	0.00000001	0.00010124
36	Yes	7	0.00000001	0.00010841
37	Yes	8	0.00000001	0.00006186
38	Yes	8	0.00000001	0.00008235

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 133	30.066	29	1.6831	0.0146
L2	135.95 - 98.45	25.141	29	1.6533	0.0098
L3	102.3 - 64.8	14.410	29	1.3305	0.0043
L4	69.5 - 32	6.642	29	0.9027	0.0021
L5	37.5 - 0	1.948	29	0.4729	0.0009

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.0000	HP4-102	29	30.066	1.6831	0.0146	33784
148.0000	(4) TMBXX-6516-R2M w/ Mount Pipe	29	29.360	1.6810	0.0139	33784
140.0000	(2) APXVSPP18-C-A20 w/ Mount Pipe	29	26.549	1.6672	0.0111	16894
127.0000	742 213 w/ Mount Pipe	29	22.092	1.5983	0.0076	8114
110.0000	7770.00 w/ Mount Pipe	29	16.659	1.4251	0.0050	5016

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 133	86.851	4	4.8680	0.0428
L2	135.95 - 98.45	72.635	4	4.7809	0.0287
L3	102.3 - 64.8	41.653	4	3.8473	0.0124
L4	69.5 - 32	19.207	4	2.6107	0.0060
L5	37.5 - 0	5.634	4	1.3679	0.0025

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.0000	HP4-102	4	86.851	4.8680	0.0428	11836
148.0000	(4) TMBXX-6516-R2M w/ Mount Pipe	4	84.814	4.8616	0.0406	11836
140.0000	(2) APXVSPP18-C-A20 w/ Mount Pipe	4	76.699	4.8212	0.0324	5918
127.0000	742 213 w/ Mount Pipe	4	63.833	4.6216	0.0222	2841
110.0000	7770.00 w/ Mount Pipe	4	48.147	4.1209	0.0146	1754

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	150 - 133 (1)	TP26x21.83x0.25	17.0000	0.0000	0.0	39.000	19.8584	-4.20	774.48	0.005
L2	133 - 98.45 (2)	TP34.0625x24.7764x0.3125	37.5000	0.0000	0.0	39.000	32.5302	-12.30	1268.68	0.010
L3	98.45 - 64.8 (3)	TP41.75x32.4841x0.375	37.5000	0.0000	0.0	39.000	47.8643	-19.15	1866.71	0.010
L4	64.8 - 32 (4)	TP49.0625x39.8387x0.375	37.5000	0.0000	0.0	39.000	56.3401	-27.31	2197.26	0.012
L5	32 - 0 (5)	TP56.125x46.9597x0.375	37.5000	0.0000	0.0	38.374	66.3564	-38.32	2546.35	0.015

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	150 - 133 (1)	TP26x21.83x0.25	78.94	7.741	39.000	0.198	0.00	0.000	39.000	0.000
L2	133 - 98.45 (2)	TP34.0625x24.7764x0.3125	632.94	28.898	39.000	0.741	0.00	0.000	39.000	0.000
L3	98.45 - 64.8 (3)	TP41.75x32.4841x0.375	1407.93	35.623	39.000	0.913	0.00	0.000	39.000	0.000
L4	64.8 - 32 (4)	TP49.0625x39.8387x0.375	2263.39	41.276	39.000	1.058	0.00	0.000	39.000	0.000
L5	32 - 0 (5)	TP56.125x46.9597x0.375	3377.82	44.353	38.374	1.156	0.00	0.000	38.374	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	150 - 133 (1)	TP26x21.83x0.25	10.45	0.526	26.000	0.040	3.27	0.156	26.000	0.006
L2	133 - 98.45 (2)	TP34.0625x24.7764x0.3125	22.04	0.677	26.000	0.052	3.86	0.086	26.000	0.003
L3	98.45 - 64.8 (3)	TP41.75x32.4841x0.375	25.25	0.528	26.000	0.041	3.86	0.048	26.000	0.002
L4	64.8 - 32 (4)	TP49.0625x39.8387x0.375	28.18	0.500	26.000	0.038	3.85	0.034	26.000	0.001
L5	32 - 0 (5)	TP56.125x46.9597x0.375	31.30	0.472	26.000	0.036	3.85	0.025	26.000	0.001

Pole Interaction Design Data

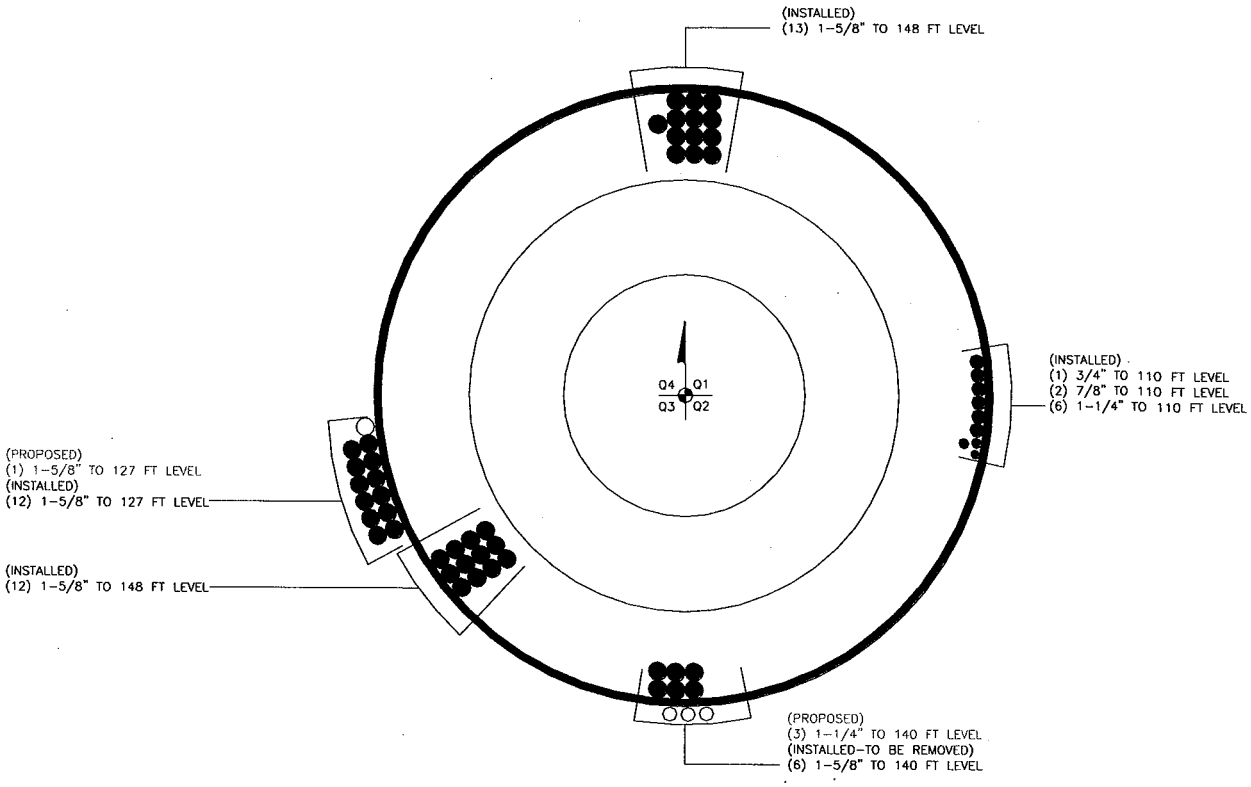
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 133 (1)	0.005	0.198	0.000	0.040	0.006	0.205 ✔	1.333	H1-3+VT ✔
L2	133 - 98.45 (2)	0.010	0.741	0.000	0.052	0.003	0.752 ✔	1.333	H1-3+VT ✔
L3	98.45 - 64.8 (3)	0.010	0.913	0.000	0.041	0.002	0.924 ✔	1.333	H1-3+VT ✔
L4	64.8 - 32 (4)	0.012	1.058	0.000	0.038	0.001	1.071 ✔	1.333	H1-3+VT ✔
L5	32 - 0 (5)	0.015	1.156	0.000	0.036	0.001	1.171 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	150 - 133	Pole	TP26x21.83x0.25	1	-4.20	1032.38	15.3	Pass
L2	133 - 98.45	Pole	TP34.0625x24.7764x0.3125	2	-12.30	1691.15	56.4	Pass
L3	98.45 - 64.8	Pole	TP41.75x32.4841x0.375	3	-19.15	2488.32	69.3	Pass
L4	64.8 - 32	Pole	TP49.0625x39.8387x0.375	4	-27.31	2928.95	80.4	Pass
L5	32 - 0	Pole	TP56.125x46.9597x0.375	5	-38.32	3394.28	87.9	Pass
							Summary	
						Pole (L5)	87.9	Pass
						RATING =	**87.9**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

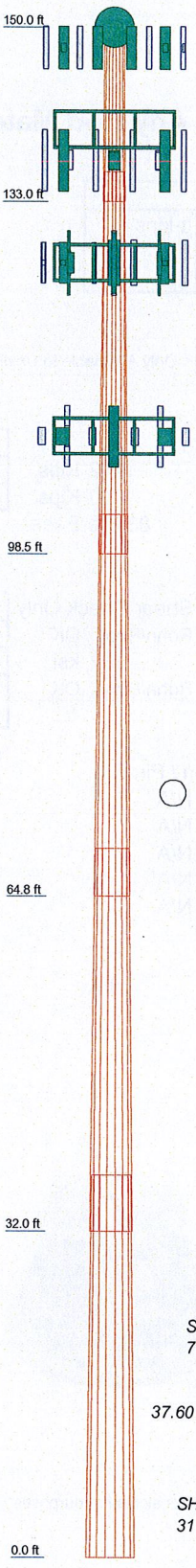


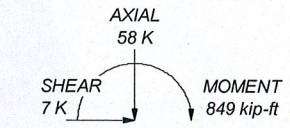
APPENDIX C

ADDITIONAL CALCULATIONS

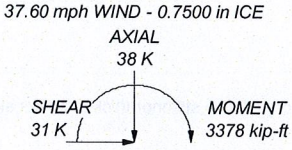
Section	1	2	3	4	5
Length (ft)	17.0000	37.5000	37.5000	37.5000	37.5000
Number of Sides	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.3750	0.3750
Socket Length (ft)	2.9500	3.8500	4.7000	5.5000	
Top Dia (in)	21.8300	24.7764	32.4841	39.8387	46.9597
Bot Dia (in)	26.0000	34.0625	41.7500	49.0625	56.1250
Grade			A572-65		
Weight (K)	1.1	3.7	5.6	6.7	7.8

24.8





TORQUE 1 kip-ft
37.60 mph WIND - 0.7500 in ICE



TORQUE 4 kip-ft
REACTIONS - 85.00 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(4) TMBXX-6516-R2M w/ Mount Pipe	148	(2) APL866513-42T0 w/ Mount Pipe	127
(4) TMBXX-6516-R2M w/ Mount Pipe	148	(2) APL866513-42T0 w/ Mount Pipe	127
(4) TMBXX-6516-R2M w/ Mount Pipe	148	(2) BXA-171063/8CF w/ Mount Pipe	127
(2) ETW190VS12UB	148	(2) SLCP 2x6014 w/ Mount Pipe	127
(2) ETW190VS12UB	148	SLCP 2x6014 w/ Mount Pipe	127
(2) ETW190VS12UB	148	BXA-171063-12BF w/ Mount Pipe	127
Sector Mount [SM 411-3]	148	(2) FD9R6004/2C-3L	127
HP4-102	148	(2) FD9R6004/2C-3L	127
(2) APXVSPP18-C-A20 w/ Mount Pipe	140	(2) FD9R6004/2C-3L	127
(2) APXVSPP18-C-A20 w/ Mount Pipe	140	Platform Mount [LP 304-1]	127
1900MHz RRH	140	742 213 w/ Mount Pipe	127
1900MHz RRH	140	7770.00 w/ Mount Pipe	110
1900MHz RRH	140	7770.00 w/ Mount Pipe	110
800MHZ RRH	140	(2) LGP21401	110
800MHZ RRH	140	(2) LGP21401	110
800MHZ RRH	140	(2) LGP21401	110
Platform Mount [LP 712-1]	140	P65-16-XLH-RR w/ Mount Pipe	110
(2) APXVSPP18-C-A20 w/ Mount Pipe	140	P65-16-XLH-RR w/ Mount Pipe	110
742 213 w/ Mount Pipe	127	P65-16-XLH-RR w/ Mount Pipe	110
742 213 w/ Mount Pipe	127	(2) RRUS-11	110
RRH2x40-AWS	127	(2) RRUS-11	110
RRH2x40-AWS	127	(2) RRUS-11	110
RRH2x40-AWS	127	DC6-48-60-18-8F	110
DB-B1-6C-8AB-0Z	127	Platform Mount [LP 303-1]	110
(2) APL866513-42T0 w/ Mount Pipe	127	7770.00 w/ Mount Pipe	110

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85.00 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.60 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50.00 mph wind.
5. TOWER RATING: 87.9%

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

Job:	***150-ft Monopole / Newton, CT / Newton/Rt-25***		
Project:	***PJF: 37513-1642 (BU: 8256222)***		
Client: Crown Castle	Drawn by: Jason Martin, E.I.	App'd:	
Code: TIA/EIA-222-F	Date: 01/15/14	Scale: NTS	
Path:		Dwg No. E-1	

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

TIA Rev F

Site Data

BU#: *826222*
Site Name: *Newtown/RT-25*
App #:

Pole Manufacturer:	*Pirod*

Reactions		
Moment:	3378	ft-kips
Axial:	38	kips
Shear:	31	kips

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

Anchor Rod Data		
Qty:	39	
Diam:	1.25	in
Rod Material:	Other	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	61	in

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	67.2 Kips	Service, ASD
Allowable Tension:	81.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	83.0% **Pass**	

Plate Data		
Diam:	65	in
Thick:	1.5	in
Grade:	50	ksi
Single-Rod B-eff:	4.57	in

Base Plate Results Shear Check Only

		Stiffened
Base Plate Stress:	Rohn/Pirod, OK	Service, ASD
Allowable Plate Stress:	26.7 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	Rohn/Pirod, OK	Y.L. Length: N/A, Roark

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.5	in
Width:	4.5	in
Height:	8	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Stiffener Results N/A for Rohn / Pirod

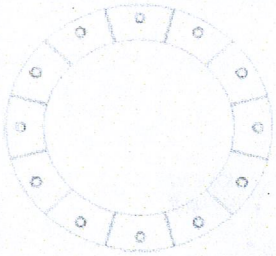
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

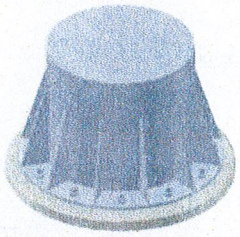
Pole Results

Pole Punching Shear Check: N/A

Pole Data		
Diam:	56.125	in
Thick:	0.375	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

PJF job no. **37513-1642** Project name **BU 826222 (Pad Bending Check, Part 1)**

Foundation Loads:

Pole weight or tower leg compression =	38	(kips)
Horizontal load at top of pier =	31	(kips)
Overturning moment at top of pier=	2570	(ft-kips)

Design criteria:

Safety factor against overturning =	1.5	

Soil Properties:

Soil density =	125	(pcf)
Allowable soil bearing =	15	(ksf)
Depth to water table =	99	(ft)

Dimensions:

Pier shape (round or square)	R	("R" or "S")
Pier width =	7	(ft)
Pier height above grade =	0.5	(ft)
depth to bottom of footing =	6	(ft)
Footing thickness =	2	(ft)
Footing width =	21	(ft)
Footing length =	21	(ft)

Concrete:

Concrete strength =	4	(ksi)
Rebar strength =	60	(ksi)
ultimate load factor =	1.3	

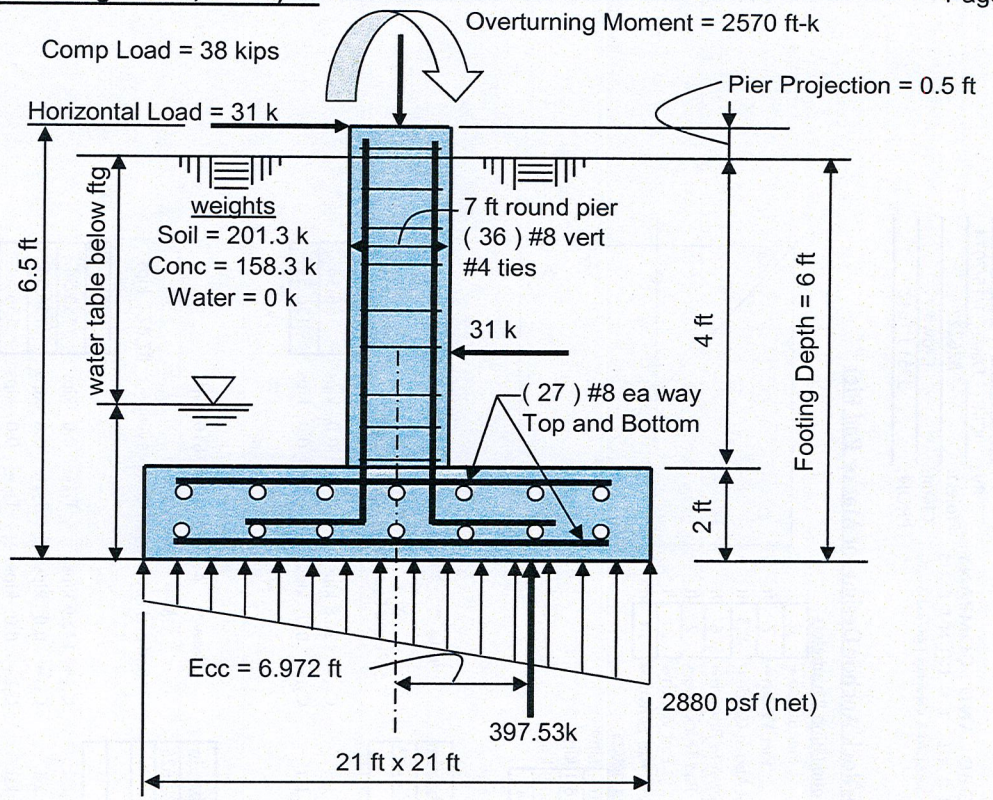
Reinforcing Steel:

	Pad	
minimum cover over rebar =	3	inches
size of pad rebar =	#8	bar
quantity of pad rebar =	27	(ea direction)

Reinforcing Steel:

	Pier	
size of vert rebar in pier=	#8	bar
vertical rebar quantity =	36	
size of pier ties =	#4	bar
minimum cover over rebar =	3	inches

Total volume of concrete = 39.1 cu yd



Summary of analysis results	
Maximum Net Soil Bearing = 2.88 ksf Allowable Net Soil Bearing = 15 ksf **Soil Bearing Stress Ratio = 0.19 Okay**	Ult Bending Shear Capacity = 126 psi Ult Bending Shear Stress = 70 psi **Bending Shear Stress Ratio = 0.55 Okay**
SEE "CHECK OF OVERTURNING CAPACITY" PAGE FOR OVERTURNING CALCUALATIONS & CAPACITY	Pad Bending Moment Capacity= 1800 ft-k Pad Bending Moment = 1330 ft-k **Bending Moment Stress Ratio = 0** **SEE "MICROPILE/ROCK ANCHOR DESIGNFOR MAT OR PAD PIER" PAGE**

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By: JCM Date: 1/15/2014
Project: 826222
Client: Crown
PROJ#: 37513-1642

Revision Date: 6/17/2013

Micropile/Rock Anchor Design for Mat or Pad Pier

TNX Reactions

M =	808	k-ft
A =	0	kips
S =	0	kips

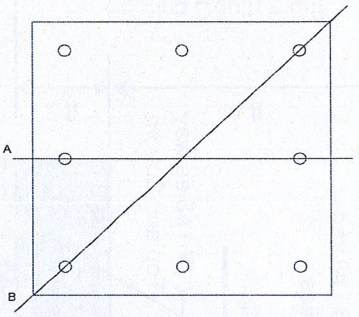
Foundation Parameters

Pier Shape =	R	
Pier Width =	7	ft
Height Above Grade =	0.5	ft
Depth to Bottom =	6	ft
Pad Thickness =	2	ft
Pad Width =	21	ft
Pad Length =	21	ft

Soil Parameters
Unit Weight = 120 pcf

Micropile/Rock Anchor Parameters

Rock Anchor Lockoff =	0	kips
Steel Yield Cap. =	218.1	kips
Steel Ultimate Cap =	260.9	ksi
Total # =	4	



Wind Side (About A)

Bolt #	#	Area, in^2	Ybar, in
1	4	3.07	62.2254
2	0		

$I_{boltsA} = \Sigma NA\bar{y}^2 =$ 47548 in^4
M = 9696 k-in
Soil and Foundation Compression = 87.87 kips

			Capacity,k
$f_{1A} = M*y_{bar1}/I_{boltsA}$ = 12.7 ksi	C_{1A} = 126.8 kips	T_{1A} = 0.0 kips	156.54
$f_{2A} = M*y_{bar2}/I_{boltsA}$ = 0 ksi	C_{2A} = 0.0 kips	T_{2A} = 0.0 kips	156.54

Wind Into Corner (About B)

Bolt #	#	Area, in^2	Ybar, in
1	2	3.07	88.0625
2	0		
3	0		
4	0		

$I_{boltsB} = \Sigma NA\bar{y}^2 =$ 47616 in^4
M = 9696 k-in
Soil and Foundation Compression = 87.87 kips

			Capacity,k
$f_{1B} = M*y_{bar1}/I_{boltsB}$ = 17.9 ksi	C_{1B} = 142.9 kips	T_{1B} = 0.0 kips	156.54
$f_{2B} = M*y_{bar2}/I_{boltsB}$ = 0.0 ksi	C_{2B} = 0.0 kips	T_{2B} = 0.0 kips	156.54
$f_{3B} = M*y_{bar3}/I_{boltsB}$ = 0.0 ksi	C_{3B} = 0.0 kips	T_{3B} = 0.0 kips	156.54
$f_{4B} = M*y_{bar4}/I_{boltsB}$ = 0.0 ksi	C_{3B} = 0.0 kips	T_{3B} = 0.0 kips	156.54

Steel Check
Revision = F

Actual Load
Max Tension/Compression Load = 142.9 kips

Capacity
Capacity = 0.6*Steel Ultimate Capacity = 156.5 kips
Stress Ratio = 91.3%

Bending Check (Wind into side)
Distance from center to end of pier = 42.0 in.
Bending Moment = ∑[# of Bolts * (ybar- 42.0 in.)*Tension] = 427.5 k-ft
Additional Pad Bending Moment from Pad & Pier Spreadsheet = 1336.0 k-ft
Use 1891.8 k-ft to analyze bending in pad

Bottom Clear Dist. =	4	in.	b = 84.0	in.
f_c' =	4	ksi	As = 21.33	in^2
fy =	60	ksi	a = 4.48	in.
Number of Bars =	27		d = 19.5	in.
Bar # =	8			
Bar Area =	0.790	in.^{2}		
Bar Diameter =	1.000	in.		

$$a = \frac{A_s * f_y}{0.85 * f'_c * b}$$

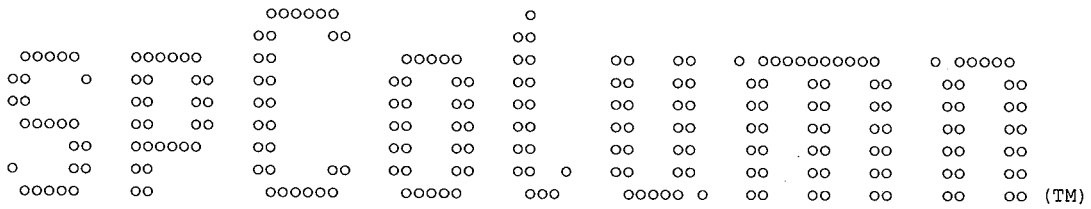
$$\emptyset M_n = 0.9 * A_s * f_y * \left(d - \frac{a}{2}\right)$$

øMn = 1969.7 k-ft (Overrided from SPColumn)
Capacity = 96.0%

Micropile Embedment Check

Hole Diameter =	10.5	in
Skin Friction =	30	psi
Actual Embed =	27	ft

Required Embedment = 24.1 ft
Ratio = 89.2%



spColumn v4.80 (TM)
Computer program for the Strength Design of Reinforced Concrete Sections

General Information:
==========

File Name: G:\TOWER\375_Crown_Castle\2013\37513-1642 BU 826222\...\37513-1642 - Pier Steel Check.col
Project:
Column:
Code: ACI 318-05

Engineer:
Units: English

Run Option: Investigation
Run Axis: X-axis

Slenderness: Not considered
Column Type: Structural

Material Properties:
==========

f'c = 4 ksi
Ec = 3605 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

fy = 60 ksi
Es = 29000 ksi

Section:
==========

Circular: Diameter = 84 in

Gross section area, Ag = 5541.77 in^2
Ix = 2.44392e+006 in^4
rx = 21 in
Xo = 0 in

Iy = 2.44392e+006 in^4
ry = 21 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; #4 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Circular
Pattern: All Sides Equal (Cover to transverse reinforcement)
Total steel area: As = 28.44 in^2 at rho = 0.51% (Note: rho < 1.0%)
Minimum clear spacing = 5.62 in

36 #8 Cover = 3 in

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

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu	NA depth in	Dt depth in	eps_t	Phi
1	0.00	4572.75	4611.67	1.009	10.79	80.00	0.01924	0.900

*** End of output ***

Check Overturning Capacity of Foundation System

PJF job no. 37513-1642

Assumptions: 1) Micropile reinforcing has been installed
2) Wind into side of foundation is worst case scenario

Pole base moment =	3378	ft-k
Pole base shear =	31	kips
Pole axial load =	38	kips
Total foundation thickness / height =	6.5	feet
Distance from center of pole to edge of fdn =	10.5	feet
Foundation weight =	158.3	kips
Soil weight (abv fdn) =	201.3	kips
Quantity of piles =	2	
Pile yield strength =	218.1	kips
Pile distance to edge of fdn =	15.75	feet
Overturning resistance (pole/fdn/soil) =	**4174.8**	ft-k
Overturning resistance (piles) =	**6870.2**	ft-k
Total overturning resistance =	**11045.0**	ft-k
Overturning moment at base of foundation =	**3579.5**	ft-k
Required safety factor against overturning =	1.5	
% Capacity =	**48.6%**	**OK**