Robinson+Cole

EM-VER-014-130509
850 West Main, Branford

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

July 29, 2014

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

Re: **Completion of Construction Activity**

Dear Ms. Bachman:

The purpose of this letter is to notify the Siting Council that construction activity associated with the Cellco Partnership d/b/a Verizon Wireless telecommunications facility modifications listed below has been completed.

EM-VER-083-130308 – 213 Court Street, Middletown, Connecticut
EM-VER-089-130308 – 200 Stanley Street, New Britain, Connecticut
EM-VER-137-130314 – 7 Broadway Avenue Ext., Stonington, Connecticut
EM-VER-148-130312 – 20 Alexander Drive, Wallingford, Connecticut
EM-VER-089-130322 – Lester Street, New Britain, Connecticut
EM-VER-110-130325 – 21-35 East Main Street (a/k/a 1 Central Square), Plainville, Connecticut
EM-VER-155-130322 – 1358 New Britain Avenue, West Hartford, Connecticut
EM-VER-084-130411 – 26185 Research Drive, Milford, Connecticut
EM-VER-104-130401 – 2 Hinkley Hill Road, Norwich, Connecticut
EM-VER-148-130408 – 90 North Plains Industrial Road, Wallingford, Connecticut
EM-VER-159-130411 – 250 Silas Deane Highway, Wethersfield, Connecticut
EM-VER-146-130416 – 197 South Street, Vernon, Connecticut
EM-VER-076-130425 – 252 Ridge Road, Madison, Connecticut
EM-VER-077-130425 – 53 Slater Street, Manchester, Connecticut
EM-VER-129-130425 – 400 Main Street, Somers, Connecticut
EM-VER-052-130430 – Town Farm Road, Farmington, Connecticut
EM-VER-080-130430 – 38 Elm Street, Meriden, Connecticut

Robinson+Cole

EM-VER-014-130509 – 850 West Main Street, Branford, Connecticut
EM-VER-025-130506 – 705 West Johnson Avenue, Cheshire, Connecticut
EM-VER-041-130524 – 135 Henry Hill Road, East Haddam, Connecticut
EM-VER-115-130524 – 54 Waterbury Road, Prospect, Connecticut
EM-VER-156-130524 – 668 Jones Hill Road, West Haven, Connecticut
EM-VER-027-130603 – 48 Cow Hill Road, Clinton, Connecticut
EM-VER-148-130603 – 945 East Center Street, Wallingford, Connecticut

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

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter

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

May 28, 2013

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

RE: **EM-VER-014-130509** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 850 West Main Street, Branford, 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:

- 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 May 7, 2013. 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/CDM/jb

c: The Honorable Anthony "Unk" DaRos, First Selectman, Town of Branford
Daniel Shapiro, Chm, Inland Wetland Commission, Town of Branford
Laura Magaraci, Zoning Enforcement Officer, Town of Branford
Crown Castle

CONNECTICUT SITING COUNCIL

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

May 13, 2013

The Honorable Anthony "Unk" DaRos
First Selectman
Town of Branford
Town Hall
1019 Main Street
P. O. Box 150
Branford, CT 06405-0150

RE: **EM-VER-014-130509** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 850 West Main Street, Branford, Connecticut.

Dear First Selectman DaRos:

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 May 27, 2013.

Thank you for your cooperation and consideration.

Very truly yours,

Melanie A. Bachman
Acting Executive Director

MAB/jb

c: Daniel Shapiro, Chm, Inland Wetland Commission, Town of Branford
Laura Magaraci, Zoning Enforcement Officer, Town of Branford

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

May 20, 2013

The Honorable Anthony "Unk" DaRos
First Selectman
Town of Branford
Town Hall
1019 Main Street
P. O. Box 150
Branford, CT 06405-0150

RE: **EM-VER-014-130509** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 850 West Main Street, Branford, Connecticut.

Dear First Selectman DaRos:

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 May 27, 2013.

Thank you for your cooperation and consideration.

Very truly yours,

Melanie A. Bachman
Acting Executive Director

MAB/jb

c: Daniel Shapiro, Chm, Inland Wetland Commission, Town of Branford
Laura Magaraci, Zoning Enforcement Officer, Town of Branford

ROBINSON & COLE

EM-VER-014-130509

KENNETH C. BALDWIN

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Hartford, CT 06103-3597
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Also admitted in Massachusetts

May 7, 2013

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

Re: **Notice of Exempt Modification – Facility Modification**
850 West Main, Branford, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 110-foot level of the existing 130-foot tower at 850 West Main Street in Branford. The tower is owned by Crown Castle. The Council approved Cellco's shared use of this tower in 2000. Cellco now intends to replace three (3) of its existing antennas with three (3) model BXA-70063-6CF LTE antenna at the same height on the tower. Attached behind Tab 1 are the specifications for the replacement antennas.

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 Anthony DaRos, First Selectman of the Town of Branford. A copy of this letter is also being sent to SBC Real Estate Group, the owner of the property on which the tower is located.

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. Cellco's replacement antennas will be located at the 110-foot level of the 130-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 replacement antennas 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 General Power Density table for Cellco's modified facility are included behind Tab 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 antenna modifications. (*See* Structural Analysis attached behind Tab 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:
Anthony DaRos, Branford First Selectman
SBC Real Estate Group
Sandy M. Carter

Amphenol ANTENNA SOLUTIONS

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

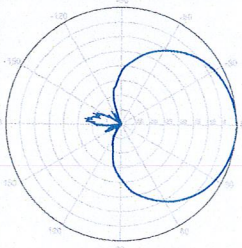
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m² Side: 0.24 m²	Front: 5.5 ft² Side: 2.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

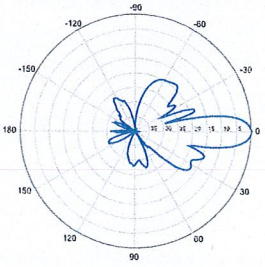
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



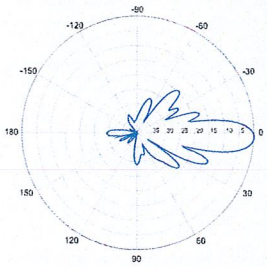
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

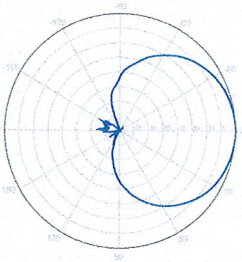


0° | Vertical | 750 MHz

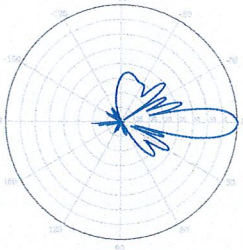
BXA-70063-6CF-EDIN-2



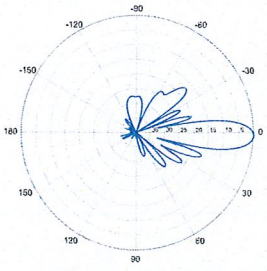
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz

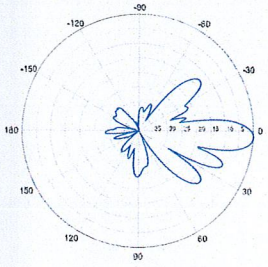


2° | Vertical | 850 MHz

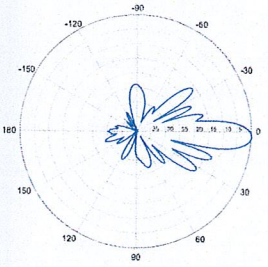
BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3

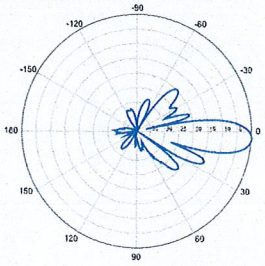


3° | Vertical | 750 MHz

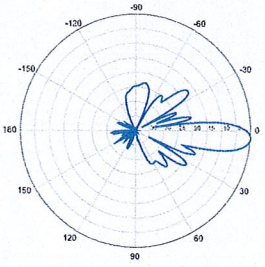


3° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-4

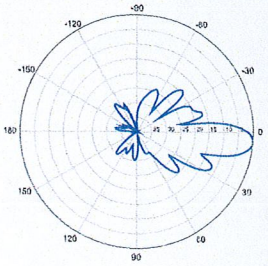


4° | Vertical | 750 MHz

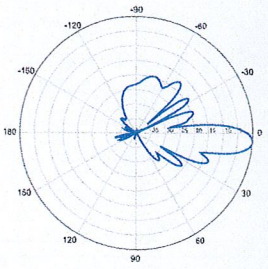


4° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-5

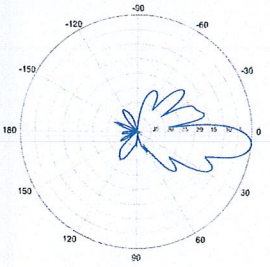


5° | Vertical | 750 MHz

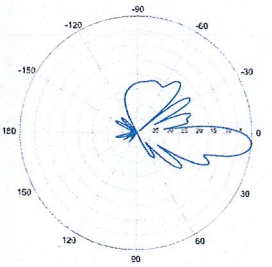


5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6

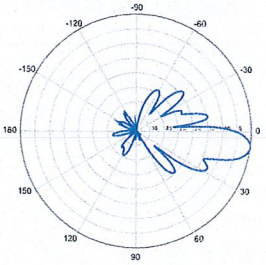


6° | Vertical | 750 MHz

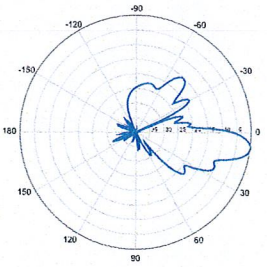


6° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-8

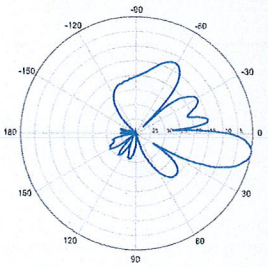


8° | Vertical | 750 MHz

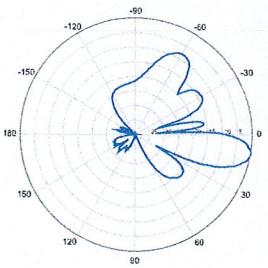


8° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-10



10° | Vertical | 750 MHz



10° | Vertical | 850 MHz

	General	Power	Density					
Site Name: Branford SW								
Tower Height: Verizon @ 110ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Sprint CDMA/LTE	3	778	120	0.0583	1900	1.0000	5.83%	
*Sprint CDMA/LTE	1	438	120	0.0109	850	0.5667	1.93%	
*Clearwire	2	153	120	0.0076	2496	1.0000	0.76%	
*Clearwire	1	211	124	0.0049	11 GHz	1.0000	0.49%	
*T-Mobile GSM	8	137	130	0.0233	1945	1.0000	2.33%	
*T-Mobile UMTS	2	770	130	0.0328	2100	1.0000	3.28%	
Verizon PCS	**14**	**272**	**110**	**0.1132**	**1970**	**1.0000**	**11.32%**	
Verizon Cellular	**9**	**271**	**110**	**0.0725**	**869**	**0.5793**	**12.51%**	
Verizon AWS	**1**	**1750**	**110**	**0.0520**	**2145**	**1.0000**	**5.20%**	
Verizon 700	**1**	**883**	**110**	**0.0262**	**698**	**0.4653**	**5.64%**	
								49.29%
* Source: Siting Council								

Date: **April 18, 2013**

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

FDH Engineering, Inc.
6521 Meridien Drive
Raleigh, NC 27616
(919) 755-1012

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Name:	Branford SW
Crown Castle Designation:	**Crown Castle BU Number:**	876322
	Crown Castle Site Name:	TARTAGLIA PROPERTY
	Crown Castle JDE Job Number:	230330
	Crown Castle Work Order Number:	594155
	Crown Castle Application Number:	185407 Rev. 5
Engineering Firm Designation:	**FDH Engineering, Inc. Project Number:**	1326251400
Site Data:	**850 West Main Street, BRANFORD, New Haven County, CT** **Latitude *41° 16' 40.188"*, Longitude *-72° 50' 12.696"*** **130 Foot - Monopole Tower**	

Dear Patrick Byrum,

FDH Engineering, Inc. 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 539518, in accordance with application 185407, revision 5.

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:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 Connecticut State Building Code based upon a wind speed of 85 mph fastest mile.

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 *FDH Engineering, Inc.* 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:

Byron K Webb

Byron K Webb, EI
Project Engineer

Reviewed by:

Christopher M. Murphy

Christopher M. Murphy, PE
President
CT PE License No. 25842

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 130 ft. Monopole tower designed by SUMMIT in July of 1998. The tower was extended per extension drawings prepared by Global Signal in December 2006. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 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
110.0	111.0	3	antel	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	-	-	-

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
128.0	130.0	3	rfs celwave	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	-	-	2
		3	rfs celwave	ATMAA1412D-1A20			
		3	rfs celwave	ATMPP1412D-1CWA			
		3	rfs celwave	APXV18-209014-C w/ Mount Pipe	6	1 5/8	1
	128.0	1	crown mounts	Platform Mount [LP 305-1]			
118.0	124.0	2	andrew	VHLP2-11	3	1/2	1
		1	dragonwave	A-ANT-23G-2-C			
	120.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	3	1 1/4	2
		9	rfs celwave	ACU-A20-N			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	argus technologies	LLPX310R w/ Mount Pipe	6	5/16	1
		3	samsung telecommunications	FDD_R6_RRH			
	118.0	1	crown mounts	Platform Mount [LP 712-1]			
116.0	116.0	3	alcatel lucent	1900MHz RRH (65MHz)	-	-	2
		3	alcatel lucent	800MHZ RRH			
		1	crown mounts	Side Arm Mount [SO 103-3]			

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	114.0	1	kathrein	OG-860/1920/GPS-A	1	1/2	1
	111.0	3	rfs celwave	APX75-866512-CT2 w/ Mount Pipe	-	-	3
		6	rfs celwave	APL868013-42T0 w/ Mount Pipe	12	1-5/8	1
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe			
	110.0	6	rfs celwave	FD9R6004/1C-3L			
		1	crown mounts	Platform Mount [LP 712-1]			
50.0	52.0	1	kathrein	OG-860/1920/GPS-A	1	5/16	1
	50.0	1	crown mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Existing Equipment to be Removed; Not Considered in this Analysis.

Table 3 - Design 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)
120	120	12	decibel	DB980H	---	---
110	110	12	generic	Panel Antenna (CaAa=3.9 ft^2)		
100	100	12	generic	Panel Antenna (CaAa=3.9 ft^2)		
85	85	2	generic	Whip Antenna		
50	50	1	generic	GPS Antenna		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Goodkind & O'Dea, Inc.	1614542	CCISITES
4-POST-MODIFICATION INSPECTION	Tower Engineering Professionals	1956410	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Paul J. Ford and Company	1613605	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Paul J. Ford and Company	1529811	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Global Signal Services LLC	2483868	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) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

This analysis may be affected if any assumptions are not valid or have been made in error. FDH Engineering, Inc. should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	130 - 120.5	Pole	TP18.5x18.5x0.375	1	-2.00	597.73	11.4	Pass
L2	120.5 - 120	Pole	TP22x18.5x0.375	2	-2.00	597.73	11.4	Pass
L3	120 - 77	Pole	TP29.742x22x0.25	3	-8.91	1205.97	76.7	Pass
L4	77 - 37.75	Pole	TP36.308x28.5668x0.3125	4	-14.76	1840.62	94.6	Pass
L5	37.75 - 0	Pole	TP42.48x34.8729x0.375	5	-23.68	2643.11	97.0	Pass
							Summary	
						Pole (L5)	97.0	Pass
						Rating =	97.0	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Flange Connection	120	18.3	Pass
1	Anchor Rods	0	60.1	Pass
1	Base Plate	0	70.7	Pass
1	Base Foundation	0	42.9	Pass
1	Base Foundation Soil Interaction	0	47.6	Pass

Structure Rating (max from all components) =	97.0%

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

4.1) Recommendations

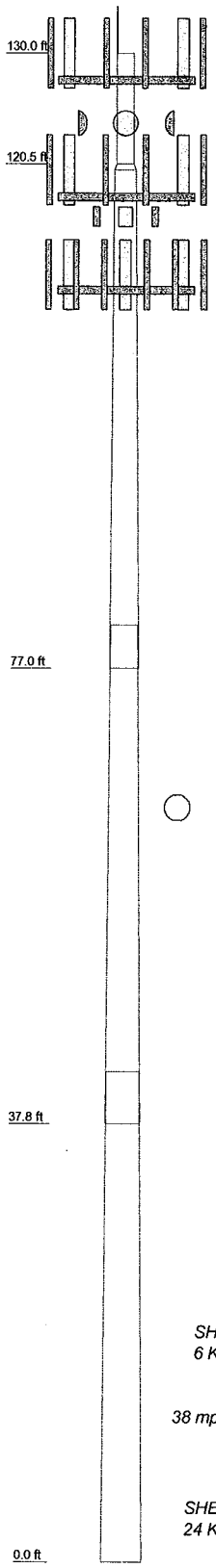
The tower and its foundation have sufficient capacity to carry the existing, reserved and proposed loads. No modifications are required at this time.

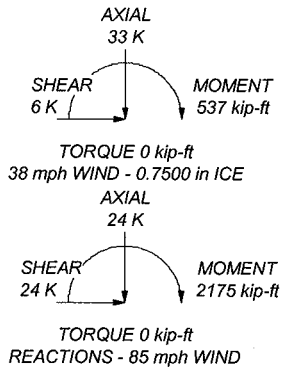
APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5
Length (ft)	9.50	0.50	43.00	43.00	42.25
Number of Sides	1	1	12	12	12
Thickness (in)	0.3750	0.3750	0.2500	0.3125	0.3750
Socket Length (ft)			3.75	4.50	
Top Dia (in)	18.5000	18.5000	22.0000	28.5668	34.8729
Bot Dia (in)	18.5000	22.0000	29.7420	36.3080	42.4800
Grade	A53-B-35			A572-65	
Weight (K)	0.7	0.0	3.0	4.7	6.6

Total Weight (K) 15.1





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	130	Mount Pipe	118
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	128	Mount Pipe	118
		Mount Pipe	118
APXV18-209014-C w/ Mount Pipe	128	VHLP2-11	118
ATMAA1412D-1A20	128	A-ANT-23G-2-C	118
ATMPP1412D-1CWA	128	VHLP2-11	118
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	128	800MHZ RRH	116
		alcatel lucent 1900MHz RRH (65MHz)	116
APXV18-209014-C w/ Mount Pipe	128	800MHZ RRH	116
ATMAA1412D-1A20	128	Side Arm Mount [SO 103-3]	116
ATMPP1412D-1CWA	128	(2) Mount Pipe	116
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	128	(2) Mount Pipe	116
		(2) Mount Pipe	116
APXV18-209014-C w/ Mount Pipe	128	alcatel lucent 1900MHz RRH (65MHz)	116
ATMAA1412D-1A20	128	800MHZ RRH	116
ATMPP1412D-1CWA	128	alcatel lucent 1900MHz RRH (65MHz)	116
Platform Mount [LP 305-1]	128	(2) APL868013-42T0 w/ Mount Pipe	110
Empty Mount Pipe	128	(2) FD9R6004/1C-3L	110
Empty Mount Pipe	128	(2) FD9R6004/1C-3L	110
Empty Mount Pipe	128	(2) FD9R6004/1C-3L	110
LLPX310R w/ Mount Pipe	118	MG D3-800Tx w/ Mount Pipe	110
FDD_R6_RRH	118	MG D3-800Tx w/ Mount Pipe	110
800 EXTERNAL NOTCH FILTER	118	MG D3-800Tx w/ Mount Pipe	110
(3) ACU-A20-N	118	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	110
APXVSPP18-C-A20 w/ Mount Pipe	118		
LLPX310R w/ Mount Pipe	118	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	110
FDD_R6_RRH	118		
800 EXTERNAL NOTCH FILTER	118	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	110
(3) ACU-A20-N	118		
APXVSPP18-C-A20 w/ Mount Pipe	118	Platform Mount [LP 712-1]	110
LLPX310R w/ Mount Pipe	118	OG-860/1920/GPS-A	110
FDD_R6_RRH	118	(2) APL868013-42T0 w/ Mount Pipe	110
800 EXTERNAL NOTCH FILTER	118	(2) APL868013-42T0 w/ Mount Pipe	110
(3) ACU-A20-N	118	Side Arm Mount [SO 701-1]	50
APXVSPP18-C-A20 w/ Mount Pipe	118	OG-860/1920/GPS-A	50
Platform Mount [LP 712-1]	118		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	A572-65	65 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 97%

FDH Consulting Engineers

FDH Engineering, Inc.
6521 Meridien Drive
Raleigh, NC 27616
Phone: (919) 755-1012
FAX: (919) 755-1031

Job: *Tartaglia Property BU#876322*		
Project: *1326251400*		
Client: Crown Castle	Drawn by: Byron K Webb	App'd:
Code: TIA/EIA-222-F	Date: 04/18/13	Scale: NTS
Path:		Dwg No. E-1

Tower Input Data

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

Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	130.00-120.50	9.50	0.00	Round	18.5000	18.5000	0.3750		A53-B-35 (35 ksi)
L2	120.50-120.00	0.50	0.00	Round	18.5000	22.0000	0.3750		A53-B-35 (35 ksi)
L3	120.00-77.00	43.00	3.75	12	22.0000	29.7420	0.2500	1.0000	A572-65 (65 ksi)
L4	77.00-37.75	43.00	4.50	12	28.5668	36.3080	0.3125	1.2500	A572-65 (65 ksi)
L5	37.75-0.00	42.25		12	34.8729	42.4800	0.3750	1.5000	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	18.5000	21.3530	877.5217	6.4162	9.2500	94.8672	1752.6528	10.6701	0.0000	0
	18.5000	21.3530	877.5217	6.4162	9.2500	94.8672	1752.6528	10.6701	0.0000	0
L2	18.5000	21.3530	877.5217	6.4162	9.2500	94.8672	1752.6528	10.6701	0.0000	0
	22.0000	25.4764	1490.3634	7.6552	11.0000	135.4876	2976.6666	12.7306	0.0000	0
L3	22.7761	17.5087	1057.2060	7.7865	11.3960	92.7699	2142.1860	8.6173	5.2260	20.904
	30.7912	23.7411	2635.6911	10.5581	15.4064	171.0782	5340.6247	11.6846	7.3009	29.203
L4	30.2735	28.4309	2896.9880	10.1150	14.7976	195.7740	5870.0831	13.9928	6.8184	21.819
	37.5888	36.2205	5990.1331	12.8864	18.8075	318.4963	12137.6337	17.8266	8.8930	28.458
L5	36.9419	41.6562	6327.7629	12.3502	18.0642	350.2940	12821.7632	20.5019	8.3409	22.242
	43.9785	50.8418	11504.6684	15.0736	22.0046	522.8292	23311.5772	25.0228	10.3796	27.679

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 130.00-120.50				1	1	1		
L2 120.50-120.00				1	1	1		
L3 120.00-77.00				1	1	1		
L4 77.00-37.75				1	1	1		
L5 37.75-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8")	C	No	Inside Pole	128.00 - 0.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
7983A(1/2")	C	No	Inside Pole	118.00 - 0.00	3	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08
						2" Ice	0.00	0.08
						4" Ice	0.00	0.08
9207(5/16")	C	No	Inside Pole	118.00 - 0.00	6	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
						2" Ice	0.00	0.60
						4" Ice	0.00	0.60
HB114-1-0813U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	118.00 - 0.00	1	No Ice	0.15	1.20
						1/2" Ice	0.25	2.45
						1" Ice	0.35	4.30
						2" Ice	0.55	9.85
						4" Ice	0.95	28.27
HB114-1-0813U4-M5J(1 1/4")	C	No	Inside Pole	118.00 - 0.00	2	No Ice	0.00	1.20
						1/2" Ice	0.00	1.20
						1" Ice	0.00	1.20
						2" Ice	0.00	1.20
						4" Ice	0.00	1.20
LDF4-50A(1/2")	C	No	Inside Pole	110.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
LDF7-50A(1-5/8")	C	No	Inside Pole	110.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
860 10000(5/16)	C	No	Inside Pole	50.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00

***

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Safety Line 3/8	C	No	Inside Pole	130.00 - 0.00	1	No Ice	0.00	0.22
						1/2" Ice	0.00	0.22
						1" Ice	0.00	0.22
						2" Ice	0.00	0.22
						4" Ice	0.00	0.22

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	130.00-120.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.04
L2	120.50-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L3	120.00-77.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.314	0.86
L4	77.00-37.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.044	0.89
L5	37.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.813	0.85

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	130.00-120.50	A	0.880	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.04
L2	120.50-120.00	A	0.876	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L3	120.00-77.00	A	0.854	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	13.320	0.96
L4	77.00-37.75	A	0.801	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	12.752	0.99
L5	37.75-0.00	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	11.862	0.94

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	130.00-120.50	0.0000	0.0000	0.0000	0.0000
L2	120.50-120.00	0.0000	0.0000	0.0000	0.0000
L3	120.00-77.00	-0.1798	0.1038	-0.3350	0.1934
L4	77.00-37.75	-0.1894	0.1093	-0.3604	0.2081
L5	37.75-0.00	-0.1910	0.1103	-0.3589	0.2072

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning Rod	C	From Leg	0.00	0.0000	130.00	No Ice		0.25	0.25	0.03
			0.00			1/2" Ice		0.66	0.66	0.03
			2.00			1" Ice		0.97	0.97	0.04
						2" Ice		1.49	1.49	0.06
						4" Ice		2.68	2.68	0.14
***										
APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe	A	From Leg	4.00	0.0000	128.00	No Ice		7.47	3.49	0.06
			0.00			1/2" Ice		7.99	4.26	0.11
			2.00			1" Ice		8.52	4.96	0.16
						2" Ice		9.59	6.40	0.30
						4" Ice		11.87	9.49	0.68
APXV18-209014-C w/ Mount Pipe	A	From Leg	4.00	0.0000	128.00	No Ice		3.72	3.31	0.04
			0.00			1/2" Ice		4.13	4.02	0.07
			2.00			1" Ice		4.56	4.68	0.11
						2" Ice		5.51	6.07	0.21
						4" Ice		7.55	9.05	0.52
ATMAA1412D-1A20	A	From Leg	4.00	0.0000	128.00	No Ice		1.17	0.47	0.01
			0.00			1/2" Ice		1.31	0.57	0.02
			2.00			1" Ice		1.47	0.69	0.03
						2" Ice		1.81	0.95	0.06
						4" Ice		2.58	1.57	0.14
ATMPP1412D-1CWA	A	From Leg	4.00	0.0000	128.00	No Ice		1.17	0.42	0.01
			0.00			1/2" Ice		1.32	0.53	0.02
			2.00			1" Ice		1.48	0.65	0.03
						2" Ice		1.82	0.92	0.05
						4" Ice		2.61	1.57	0.13
APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe	B	From Leg	4.00	0.0000	128.00	No Ice		7.47	3.49	0.06
			0.00			1/2" Ice		7.99	4.26	0.11
			2.00			1" Ice		8.52	4.96	0.16
						2" Ice		9.59	6.40	0.30
						4" Ice		11.87	9.49	0.68
APXV18-209014-C w/ Mount Pipe	B	From Leg	4.00	0.0000	128.00	No Ice		3.72	3.31	0.04
			0.00			1/2" Ice		4.13	4.02	0.07
			2.00			1" Ice		4.56	4.68	0.11
						2" Ice		5.51	6.07	0.21
						4" Ice		7.55	9.05	0.52
ATMAA1412D-1A20	B	From Leg	4.00	0.0000	128.00	No Ice		1.17	0.47	0.01
			0.00			1/2" Ice		1.31	0.57	0.02
			2.00			1" Ice		1.47	0.69	0.03
						2" Ice		1.81	0.95	0.06
						4" Ice		2.58	1.57	0.14

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
ATMPP1412D-1CWA	B	From Leg	4.00 0.00 2.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.17 1.32 1.48 1.82 2.61	0.42 0.53 0.65 0.92 1.57	0.01 0.02 0.03 0.05 0.13
APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.47 7.99 8.52 9.59 11.87	3.49 4.26 4.96 6.40 9.49	0.06 0.11 0.16 0.30 0.68
APXV18-209014-C w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.13 4.56 5.51 7.55	3.31 4.02 4.68 6.07 9.05	0.04 0.07 0.11 0.21 0.52
ATMAA1412D-1A20	C	From Leg	4.00 0.00 2.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.17 1.31 1.47 1.81 2.58	0.47 0.57 0.69 0.95 1.57	0.01 0.02 0.03 0.06 0.14
ATMPP1412D-1CWA	C	From Leg	4.00 0.00 2.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.17 1.32 1.48 1.82 2.61	0.42 0.53 0.65 0.92 1.57	0.01 0.02 0.03 0.05 0.13
Platform Mount [LP 305-1]	C	None		0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	18.01 23.33 28.65 39.29 60.57	18.01 23.33 28.65 39.29 60.57	1.12 1.35 1.58 2.05 2.97
Empty Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.00 1.39 1.70 2.35 3.78	1.00 1.39 1.70 2.35 3.78	0.01 0.02 0.03 0.06 0.18
Empty Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.00 1.39 1.70 2.35 3.78	1.00 1.39 1.70 2.35 3.78	0.01 0.02 0.03 0.06 0.18
Empty Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	128.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.00 1.39 1.70 2.35 3.78	1.00 1.39 1.70 2.35 3.78	0.01 0.02 0.03 0.06 0.18
***									
LLPX310R w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.07 5.48 5.91 6.79 8.70	2.98 3.53 4.09 5.31 8.13	0.05 0.08 0.13 0.23 0.54
FDD_R6_RRH	A	From Leg	4.00 0.00 2.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.79 1.97 2.16 2.57 3.49	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
800 EXTERNAL NOTCH	A	From Leg	4.00	0.0000	118.00	No Ice	0.77	0.37	0.01

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
FILTER			0.00			1/2" Ice	0.89	0.46	0.02
			2.00			1" Ice	1.02	0.56	0.02
						2" Ice	1.30	0.79	0.04
						4" Ice	1.97	1.34	0.11
(3) ACU-A20-N	A	From Leg	4.00	0.0000	118.00	No Ice	0.08	0.14	0.00
			0.00			1/2" Ice	0.12	0.19	0.00
			2.00			1" Ice	0.17	0.25	0.00
						2" Ice	0.30	0.40	0.01
						4" Ice	0.67	0.80	0.04
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	0.0000	118.00	No Ice	8.50	6.95	0.08
			0.00			1/2" Ice	9.15	8.13	0.15
			2.00			1" Ice	9.77	9.02	0.22
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
LLPX310R w/ Mount Pipe	B	From Leg	4.00	0.0000	118.00	No Ice	5.07	2.98	0.05
			0.00			1/2" Ice	5.48	3.53	0.08
			2.00			1" Ice	5.91	4.09	0.13
						2" Ice	6.79	5.31	0.23
						4" Ice	8.70	8.13	0.54
FDD_R6_RRH	B	From Leg	4.00	0.0000	118.00	No Ice	1.79	0.78	0.03
			0.00			1/2" Ice	1.97	0.92	0.04
			2.00			1" Ice	2.16	1.07	0.06
						2" Ice	2.57	1.39	0.09
						4" Ice	3.49	2.14	0.20
800 EXTERNAL NOTCH FILTER	B	From Leg	4.00	0.0000	118.00	No Ice	0.77	0.37	0.01
			0.00			1/2" Ice	0.89	0.46	0.02
			2.00			1" Ice	1.02	0.56	0.02
						2" Ice	1.30	0.79	0.04
						4" Ice	1.97	1.34	0.11
(3) ACU-A20-N	B	From Leg	4.00	0.0000	118.00	No Ice	0.08	0.14	0.00
			0.00			1/2" Ice	0.12	0.19	0.00
			2.00			1" Ice	0.17	0.25	0.00
						2" Ice	0.30	0.40	0.01
						4" Ice	0.67	0.80	0.04
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	0.0000	118.00	No Ice	8.50	6.95	0.08
			0.00			1/2" Ice	9.15	8.13	0.15
			2.00			1" Ice	9.77	9.02	0.22
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
LLPX310R w/ Mount Pipe	C	From Leg	4.00	0.0000	118.00	No Ice	5.07	2.98	0.05
			0.00			1/2" Ice	5.48	3.53	0.08
			2.00			1" Ice	5.91	4.09	0.13
						2" Ice	6.79	5.31	0.23
						4" Ice	8.70	8.13	0.54
FDD_R6_RRH	C	From Leg	4.00	0.0000	118.00	No Ice	1.79	0.78	0.03
			0.00			1/2" Ice	1.97	0.92	0.04
			2.00			1" Ice	2.16	1.07	0.06
						2" Ice	2.57	1.39	0.09
						4" Ice	3.49	2.14	0.20
800 EXTERNAL NOTCH FILTER	C	From Leg	4.00	0.0000	118.00	No Ice	0.77	0.37	0.01
			0.00			1/2" Ice	0.89	0.46	0.02
			2.00			1" Ice	1.02	0.56	0.02
						2" Ice	1.30	0.79	0.04
						4" Ice	1.97	1.34	0.11
(3) ACU-A20-N	C	From Leg	4.00	0.0000	118.00	No Ice	0.08	0.14	0.00
			0.00			1/2" Ice	0.12	0.19	0.00
			2.00			1" Ice	0.17	0.25	0.00

tnxTower	Job: Tartaglia Property BU#876322	Page: 7 of 17
FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	Project: 1326251400	Date: 16:35:34 04/18/13
	Client: Crown Castle	Designed by: Byron K Webb

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
						2" Ice	0.30	0.40	0.01
						4" Ice	0.67	0.80	0.04
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.22 0.41 0.91
Platform Mount [LP 712-1]	C	None		0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.00 1.39 1.70 2.35 3.78	1.00 1.39 1.70 2.35 3.78	0.01 0.02 0.03 0.06 0.18
Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.00 1.39 1.70 2.35 3.78	1.00 1.39 1.70 2.35 3.78	0.01 0.02 0.03 0.06 0.18
Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.00 1.39 1.70 2.35 3.78	1.00 1.39 1.70 2.35 3.78	0.01 0.02 0.03 0.06 0.18
***									
alcatel lucent 1900MHz RRH (65MHz)	A	From Leg	2.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.70 2.94 3.18 3.70 4.85	2.77 3.01 3.26 3.78 4.93	0.06 0.08 0.11 0.18 0.35
800MHZ RRH	A	From Leg	2.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.49 2.71 2.93 3.41 4.46	2.07 2.27 2.48 2.93 3.93	0.05 0.07 0.10 0.16 0.32
alcatel lucent 1900MHz RRH (65MHz)	B	From Leg	2.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.70 2.94 3.18 3.70 4.85	2.77 3.01 3.26 3.78 4.93	0.06 0.08 0.11 0.18 0.35
800MHZ RRH	B	From Leg	2.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.49 2.71 2.93 3.41 4.46	2.07 2.27 2.48 2.93 3.93	0.05 0.07 0.10 0.16 0.32
alcatel lucent 1900MHz RRH (65MHz)	C	From Leg	2.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.70 2.94 3.18 3.70 4.85	2.77 3.01 3.26 3.78 4.93	0.06 0.08 0.11 0.18 0.35
800MHZ RRH	C	From Leg	2.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.49 2.71 2.93 3.41	2.07 2.27 2.48 2.93	0.05 0.07 0.10 0.16

tnxTower	Job: Tartaglia Property BU#876322	Page: 8 of 17
FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	Project: 1326251400	Date: 16:35:34 04/18/13
	Client: Crown Castle	Designed by: Byron K Webb

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	4.46	3.93	0.32
Side Arm Mount [SO 103-3]	C	None		0.0000	116.00	No Ice	9.50	9.50	0.22
						1/2" Ice	11.80	11.80	0.32
						1" Ice	14.10	14.10	0.41
						2" Ice	18.70	18.70	0.60
						4" Ice	27.90	27.90	0.97
(2) Mount Pipe	A	From Leg	2.00	0.0000	116.00	No Ice	0.87	0.87	0.02
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00			1" Ice	1.36	1.36	0.03
						2" Ice	1.90	1.90	0.06
						4" Ice	3.23	3.23	0.16
(2) Mount Pipe	B	From Leg	2.00	0.0000	116.00	No Ice	0.87	0.87	0.02
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00			1" Ice	1.36	1.36	0.03
						2" Ice	1.90	1.90	0.06
						4" Ice	3.23	3.23	0.16
(2) Mount Pipe	C	From Leg	2.00	0.0000	116.00	No Ice	0.87	0.87	0.02
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00			1" Ice	1.36	1.36	0.03
						2" Ice	1.90	1.90	0.06
						4" Ice	3.23	3.23	0.16
***									
OG-860/1920/GPS-A	A	From Leg	4.00	0.0000	110.00	No Ice	0.33	0.40	0.00
			0.00			1/2" Ice	0.43	0.51	0.01
			4.00			1" Ice	0.55	0.63	0.01
						2" Ice	0.80	0.89	0.02
						4" Ice	1.41	1.52	0.08
(2) APL868013-42T0 w/ Mount Pipe	A	From Leg	4.00	0.0000	110.00	No Ice	3.10	4.92	0.02
			0.00			1/2" Ice	3.48	5.60	0.06
			1.00			1" Ice	3.88	6.28	0.11
						2" Ice	4.76	7.71	0.22
						4" Ice	6.66	10.83	0.54
(2) APL868013-42T0 w/ Mount Pipe	B	From Leg	4.00	0.0000	110.00	No Ice	3.10	4.92	0.02
			0.00			1/2" Ice	3.48	5.60	0.06
			1.00			1" Ice	3.88	6.28	0.11
						2" Ice	4.76	7.71	0.22
						4" Ice	6.66	10.83	0.54
(2) APL868013-42T0 w/ Mount Pipe	C	From Leg	4.00	0.0000	110.00	No Ice	3.10	4.92	0.02
			0.00			1/2" Ice	3.48	5.60	0.06
			1.00			1" Ice	3.88	6.28	0.11
						2" Ice	4.76	7.71	0.22
						4" Ice	6.66	10.83	0.54
(2) FD9R6004/1C-3L	A	From Leg	4.00	0.0000	110.00	No Ice	0.37	0.08	0.00
			0.00			1/2" Ice	0.45	0.14	0.00
			0.00			1" Ice	0.54	0.20	0.01
						2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
(2) FD9R6004/1C-3L	B	From Leg	4.00	0.0000	110.00	No Ice	0.37	0.08	0.00
			0.00			1/2" Ice	0.45	0.14	0.00
			0.00			1" Ice	0.54	0.20	0.01
						2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
(2) FD9R6004/1C-3L	C	From Leg	4.00	0.0000	110.00	No Ice	0.37	0.08	0.00
			0.00			1/2" Ice	0.45	0.14	0.00
			0.00			1" Ice	0.54	0.20	0.01
						2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06

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
MG D3-800Tx w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.57 3.98 4.39 5.33 7.34	3.42 4.12 4.78 6.16 9.18	0.03 0.07 0.11 0.21 0.52
MG D3-800Tx w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.57 3.98 4.39 5.33 7.34	3.42 4.12 4.78 6.16 9.18	0.03 0.07 0.11 0.21 0.52
MG D3-800Tx w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.57 3.98 4.39 5.33 7.34	3.42 4.12 4.78 6.16 9.18	0.03 0.07 0.11 0.21 0.52
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
Platform Mount [LP 712-1]	C	None		0.0000	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
***									
OG-860/1920/GPS-A	A	From Leg	4.00 0.00 2.00	0.0000	50.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.33 0.43 0.55 0.80 1.41	0.40 0.51 0.63 0.89 1.52	0.00 0.01 0.01 0.02 0.08
Side Arm Mount [SO 701-1]	A	From Leg	0.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.85 1.14 1.43 2.01 3.17	1.67 2.34 3.01 4.35 7.03	0.07 0.08 0.09 0.12 0.18

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
VHLP2-11	A	Paraboloid w/o Radome	From Leg	3.00 0.00 6.00	0.0000		118.00	2.17	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.03 0.05 0.07 0.11 0.19
A-ANT-23G-2-C	B	Paraboloid w/o Radome	From Leg	3.00 0.00 6.00	0.0000		118.00	2.17	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.03 0.05 0.07 0.11 0.19
VHLP2-11	C	Paraboloid w/o Radome	From Leg	3.00 0.00 6.00	0.0000		118.00	2.17	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.03 0.05 0.07 0.11 0.19

Load Combinations

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

Comb. No.	Description
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	130 - 120.5	Pole	Max Tension	2	0.00	-0.00	-0.00
			Max. Compression	14	-3.69	0.03	-0.01
			Max. Mx	11	-2.01	26.51	0.46
			Max. My	2	-2.00	0.02	26.83
			Max. Vy	11	-3.50	26.51	0.46
			Max. Vx	2	-3.60	0.02	26.83
			Max. Torque	7			-0.02
L2	120.5 - 120	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-3.74	0.03	-0.01
			Max. Mx	11	-2.05	28.27	0.53
			Max. My	2	-2.04	0.02	28.64
			Max. Vy	11	-3.53	28.27	0.53
			Max. Vx	2	-3.63	0.02	28.64
			Max. Torque	7			-0.02
L3	120 - 77	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.03	0.16	-0.05
			Max. Mx	11	-8.93	532.85	5.87
			Max. My	2	-8.91	0.07	537.05
			Max. Vy	11	-16.01	532.85	5.87
			Max. Vx	2	-16.11	0.07	537.05
			Max. Torque	5			0.08
L4	77 - 37.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-22.97	0.33	0.02
			Max. Mx	11	-14.77	1228.18	11.19
			Max. My	2	-14.76	0.12	1235.93
			Max. Vy	11	-20.09	1228.18	11.19
			Max. Vx	2	-20.16	0.12	1235.93
			Max. Torque	10			-0.22
L5	37.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.95	0.53	-0.10
			Max. Mx	11	-23.68	2163.18	16.78
			Max. My	2	-23.68	0.19	2173.56
			Max. Vy	11	-24.16	2163.18	16.78
			Max. Vx	2	-24.22	0.19	2173.56
			Max. Torque	9			-0.24

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	32.95	0.00	-0.00
	Max. H_x	11	23.70	24.14	0.13
	Max. H_z	2	23.70	0.00	24.20
	Max. M_x	2	2173.56	0.00	24.20
	Max. M_z	5	2162.79	-24.14	0.13
	Max. Torsion	3	0.24	-12.18	20.81

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. Vert	2	23.70	0.00	24.20
	Min. H_x	5	23.70	-24.14	0.13
	Min. H_z	8	23.70	0.00	-24.14
	Min. M_x	8	-2166.52	0.00	-24.14
	Min. M_z	11	-2163.18	24.14	0.13
	Min. Torsion	9	-0.24	11.96	-20.94

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	23.70	-0.00	0.00	-0.00	0.19	0.00
Dead+Wind 0 deg - No Ice	23.70	-0.00	-24.20	-2173.56	0.19	-0.21
Dead+Wind 30 deg - No Ice	23.70	12.18	-20.81	-1863.15	-1095.88	-0.24
Dead+Wind 60 deg - No Ice	23.70	20.94	-12.07	-1083.36	-1877.98	-0.22
Dead+Wind 90 deg - No Ice	23.70	24.14	-0.13	-16.78	-2162.79	-0.14
Dead+Wind 120 deg - No Ice	23.70	20.99	12.10	1086.87	-1884.07	-0.01
Dead+Wind 150 deg - No Ice	23.70	11.96	20.94	1879.93	-1066.81	0.12
Dead+Wind 180 deg - No Ice	23.70	-0.00	24.14	2166.52	0.19	0.21
Dead+Wind 210 deg - No Ice	23.70	-11.96	20.94	1879.93	1067.20	0.24
Dead+Wind 240 deg - No Ice	23.70	-20.99	12.10	1086.88	1884.46	0.22
Dead+Wind 270 deg - No Ice	23.70	-24.14	-0.13	-16.78	2163.18	0.14
Dead+Wind 300 deg - No Ice	23.70	-20.94	-12.07	-1083.36	1878.37	0.01
Dead+Wind 330 deg - No Ice	23.70	-12.18	-20.81	-1863.15	1096.26	-0.12
Dead+Ice+Temp	32.95	-0.00	0.00	0.10	0.53	0.00
Dead+Wind 0 deg+Ice+Temp	32.95	0.00	-5.67	-535.77	0.57	-0.09
Dead+Wind 30 deg+Ice+Temp	32.95	2.85	-4.87	-459.57	-269.56	-0.09
Dead+Wind 60 deg+Ice+Temp	32.95	4.91	-2.83	-267.04	-462.68	-0.07
Dead+Wind 90 deg+Ice+Temp	32.95	5.65	-0.03	-3.72	-533.02	-0.03
Dead+Wind 120 deg+Ice+Temp	32.95	4.92	2.83	268.06	-464.08	0.02
Dead+Wind 150 deg+Ice+Temp	32.95	2.80	4.90	463.61	-262.93	0.06
Dead+Wind 180 deg+Ice+Temp	32.95	0.00	5.65	534.37	0.57	0.09
Dead+Wind 210 deg+Ice+Temp	32.95	-2.80	4.90	463.61	264.06	0.09
Dead+Wind 240 deg+Ice+Temp	32.95	-4.92	2.83	268.06	465.21	0.07
Dead+Wind 270 deg+Ice+Temp	32.95	-5.65	-0.03	-3.72	534.16	0.03
Dead+Wind 300 deg+Ice+Temp	32.95	-4.91	-2.83	-267.04	463.82	-0.02
Dead+Wind 330 deg+Ice+Temp	32.95	-2.85	-4.87	-459.57	270.69	-0.06
Dead+Wind 0 deg - Service	23.70	0.00	-8.37	-753.17	0.19	-0.07
Dead+Wind 30 deg - Service	23.70	4.21	-7.20	-645.66	-379.65	-0.08
Dead+Wind 60 deg - Service	23.70	7.25	-4.18	-375.44	-650.68	-0.08
Dead+Wind 90 deg - Service	23.70	8.35	-0.05	-5.82	-749.26	-0.05
Dead+Wind 120 deg - Service	23.70	7.26	4.19	376.66	-652.80	-0.00
Dead+Wind 150 deg - Service	23.70	4.14	7.24	651.48	-369.57	0.04
Dead+Wind 180 deg - Service	23.70	0.00	8.35	750.72	0.19	0.07
Dead+Wind 210 deg - Service	23.70	-4.14	7.24	651.48	369.96	0.08
Dead+Wind 240 deg - Service	23.70	-7.26	4.19	376.66	653.19	0.08
Dead+Wind 270 deg - Service	23.70	-8.35	-0.05	-5.82	749.64	0.05
Dead+Wind 300 deg - Service	23.70	-7.25	-4.18	-375.44	651.07	0.00
Dead+Wind 330 deg - Service	23.70	-4.21	-7.20	-645.66	380.03	-0.04

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-23.70	0.00	0.00	23.70	0.00	0.000%
2	0.00	-23.70	-24.20	0.00	23.70	24.20	0.005%
3	12.18	-23.70	-20.81	-12.18	23.70	20.81	0.000%
4	20.94	-23.70	-12.07	-20.94	23.70	12.07	0.000%
5	24.14	-23.70	-0.13	-24.14	23.70	0.13	0.002%
6	20.99	-23.70	12.10	-20.99	23.70	-12.10	0.000%
7	11.96	-23.70	20.94	-11.96	23.70	-20.94	0.000%
8	0.00	-23.70	24.15	0.00	23.70	-24.14	0.005%
9	-11.96	-23.70	20.94	11.96	23.70	-20.94	0.000%
10	-20.99	-23.70	12.10	20.99	23.70	-12.10	0.000%
11	-24.14	-23.70	-0.13	24.14	23.70	0.13	0.002%
12	-20.94	-23.70	-12.07	20.94	23.70	12.07	0.000%
13	-12.18	-23.70	-20.81	12.18	23.70	20.81	0.000%
14	0.00	-32.95	0.00	0.00	32.95	-0.00	0.000%
15	0.00	-32.95	-5.67	-0.00	32.95	5.67	0.001%
16	2.85	-32.95	-4.87	-2.85	32.95	4.87	0.000%
17	4.91	-32.95	-2.83	-4.91	32.95	2.83	0.000%
18	5.66	-32.95	-0.03	-5.65	32.95	0.03	0.001%
19	4.92	-32.95	2.83	-4.92	32.95	-2.83	0.000%
20	2.80	-32.95	4.90	-2.80	32.95	-4.90	0.000%
21	0.00	-32.95	5.65	-0.00	32.95	-5.65	0.001%
22	-2.80	-32.95	4.90	2.80	32.95	-4.90	0.000%
23	-4.92	-32.95	2.83	4.92	32.95	-2.83	0.000%
24	-5.66	-32.95	-0.03	5.65	32.95	0.03	0.001%
25	-4.91	-32.95	-2.83	4.91	32.95	2.83	0.000%
26	-2.85	-32.95	-4.87	2.85	32.95	4.87	0.000%
27	0.00	-23.70	-8.37	-0.00	23.70	8.37	0.006%
28	4.21	-23.70	-7.20	-4.21	23.70	7.20	0.001%
29	7.25	-23.70	-4.18	-7.25	23.70	4.18	0.001%
30	8.35	-23.70	-0.05	-8.35	23.70	0.05	0.006%
31	7.26	-23.70	4.19	-7.26	23.70	-4.19	0.001%
32	4.14	-23.70	7.24	-4.14	23.70	-7.24	0.001%
33	0.00	-23.70	8.35	-0.00	23.70	-8.35	0.006%
34	-4.14	-23.70	7.24	4.14	23.70	-7.24	0.001%
35	-7.26	-23.70	4.19	7.26	23.70	-4.19	0.001%
36	-8.35	-23.70	-0.05	8.35	23.70	0.05	0.006%
37	-7.25	-23.70	-4.18	7.25	23.70	4.18	0.001%
38	-4.21	-23.70	-7.20	4.21	23.70	7.20	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00005442	0.00008415
3	Yes	20	0.00000001	0.00010986
4	Yes	20	0.00000001	0.00011015
5	Yes	16	0.00000001	0.00007780
6	Yes	20	0.00000001	0.00011086
7	Yes	20	0.00000001	0.00010794
8	Yes	15	0.00005445	0.00008402
9	Yes	20	0.00000001	0.00010837
10	Yes	20	0.00000001	0.00011070
11	Yes	16	0.00000001	0.00007783
12	Yes	20	0.00000001	0.00010999
13	Yes	20	0.00000001	0.00011026

14	Yes	6	0.00000001	0.00000001
15	Yes	16	0.00000001	0.00010618
16	Yes	17	0.00000001	0.00009192
17	Yes	17	0.00000001	0.00009232
18	Yes	16	0.00000001	0.00010553
19	Yes	17	0.00000001	0.00009284
20	Yes	17	0.00000001	0.00009076
21	Yes	16	0.00000001	0.00010587
22	Yes	17	0.00000001	0.00009159
23	Yes	17	0.00000001	0.00009287
24	Yes	16	0.00000001	0.00010578
25	Yes	17	0.00000001	0.00009234
26	Yes	17	0.00000001	0.00009272
27	Yes	14	0.00012668	0.00009180
28	Yes	17	0.00000001	0.00008282
29	Yes	17	0.00000001	0.00008381
30	Yes	14	0.00012667	0.00009382
31	Yes	17	0.00000001	0.00008415
32	Yes	17	0.00000001	0.00008136
33	Yes	14	0.00012668	0.00009149
34	Yes	17	0.00000001	0.00008227
35	Yes	17	0.00000001	0.00008383
36	Yes	14	0.00012667	0.00009388
37	Yes	17	0.00000001	0.00008349
38	Yes	17	0.00000001	0.00008367

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 120.5	32.579	35	2.0674	0.0004
L2	120.5 - 120	28.474	35	2.0551	0.0004
L3	120 - 77	28.259	35	2.0542	0.0004
L4	80.75 - 37.75	12.994	35	1.5292	0.0003
L5	42.25 - 0	3.534	35	0.7670	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
130.00	Lightning Rod	35	32.579	2.0674	0.0004	41733
128.00	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	35	31.713	2.0653	0.0004	41733
124.00	VHLP2-11	35	29.984	2.0605	0.0004	33145
118.00	LLPX310R w/ Mount Pipe	35	27.402	2.0486	0.0004	9972
116.00	alcatel lucent 1900MHz RRH (65MHz)	35	26.549	2.0397	0.0004	8422
110.00	OG-860/1920/GPS-A	35	24.029	1.9954	0.0004	6438
50.00	OG-860/1920/GPS-A	35	4.886	0.9177	0.0001	2474

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 120.5	93.761	2	5.9557	0.0018
L2	120.5 - 120	81.958	2	5.9206	0.0018
L3	120 - 77	81.340	2	5.9180	0.0018
L4	80.75 - 37.75	37.437	10	4.4073	0.0009
L5	42.25 - 0	10.191	10	2.2120	0.0004

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
130.00	Lightning Rod	2	93.761	5.9557	0.0018	14843
128.00	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	2	91.271	5.9496	0.0018	14843
124.00	VHLP2-11	2	86.297	5.9359	0.0018	11786
118.00	LLPX310R w/ Mount Pipe	2	78.874	5.9017	0.0018	3536
116.00	alcatel lucent 1900MHz RRH (65MHz)	2	76.423	5.8762	0.0018	2985
110.00	OG-860/1920/GPS-A	2	69.175	5.7489	0.0017	2277
50.00	OG-860/1920/GPS-A	10	14.088	2.6463	0.0004	862

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	130 - 120.5 (1)	TP18.5x18.5x0.375	9.50	0.00	0.0	21.000	21.3530	-2.00	448.41	0.004
L2	120.5 - 120 (2)	TP22x18.5x0.375	0.50	0.00	0.0	21.000	21.3530	-2.00	448.41	0.004
L3	120 - 77 (3)	TP29.742x22x0.25	43.00	0.00	0.0	39.000	23.1975	-8.91	904.70	0.010
L4	77 - 37.75 (4)	TP36.308x28.5668x0.3125	43.00	0.00	0.0	39.000	35.4053	-14.76	1380.81	0.011
L5	37.75 - 0 (5)	TP42.48x34.8729x0.375	42.25	0.00	0.0	39.000	50.8418	-23.68	1982.83	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	130 - 120.5 (1)	TP18.5x18.5x0.375	26.87	3.399	23.100	0.147	0.00	0.000	23.100	0.000
L2	120.5 - 120 (2)	TP22x18.5x0.375	26.87	3.399	23.100	0.147	0.00	0.000	23.100	0.000
L3	120 - 77 (3)	TP29.742x22x0.25	537.29	39.482	39.000	1.012	0.00	0.000	39.000	0.000
L4	77 - 37.75 (4)	TP36.308x28.5668x0.3125	1236.47	48.767	39.000	1.250	0.00	0.000	39.000	0.000

tnxTower	Job	Page
	Tartaglia Property BU#876322	16 of 17
FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	**Project** 1326251400	**Date** 16:35:34 04/18/13
	Client Crown Castle	**Designed by** Byron K Webb

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 $\frac{f_{by}}{F_{by}}$
L5	37.75 - 0 (5)	TP42.48x34.8729x0.375	2175.43	49.931	39.000	1.280	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	130 - 120.5 (1)	TP18.5x18.5x0.375	3.60	0.169	14.000	0.024	0.00	0.000	14.000	0.000
L2	120.5 - 120 (2)	TP22x18.5x0.375	3.64	0.170	14.000	0.020	0.00	0.000	14.000	0.000
L3	120 - 77 (3)	TP29.742x22x0.25	16.12	0.695	26.000	0.054	0.08	0.003	26.000	0.000
L4	77 - 37.75 (4)	TP36.308x28.5668x0.3125	20.19	0.570	26.000	0.045	0.22	0.004	26.000	0.000
L5	37.75 - 0 (5)	TP42.48x34.8729x0.375	24.25	0.477	26.000	0.037	0.22	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	130 - 120.5 (1)	0.004	0.147	0.000	0.024	0.000	0.152 ✓	1.333	H1-3+VT ✓
L2	120.5 - 120 (2)	0.004	0.147	0.000	0.020	0.000	0.152 ✓	1.333	H1-3+VT ✓
L3	120 - 77 (3)	0.010	1.012	0.000	0.054	0.000	1.023 ✓	1.333	H1-3+VT ✓
L4	77 - 37.75 (4)	0.011	1.250	0.000	0.045	0.000	1.262 ✓	1.333	H1-3+VT ✓
L5	37.75 - 0 (5)	0.012	1.280	0.000	0.037	0.000	1.293 ✓	1.333	H1-3+VT ✓

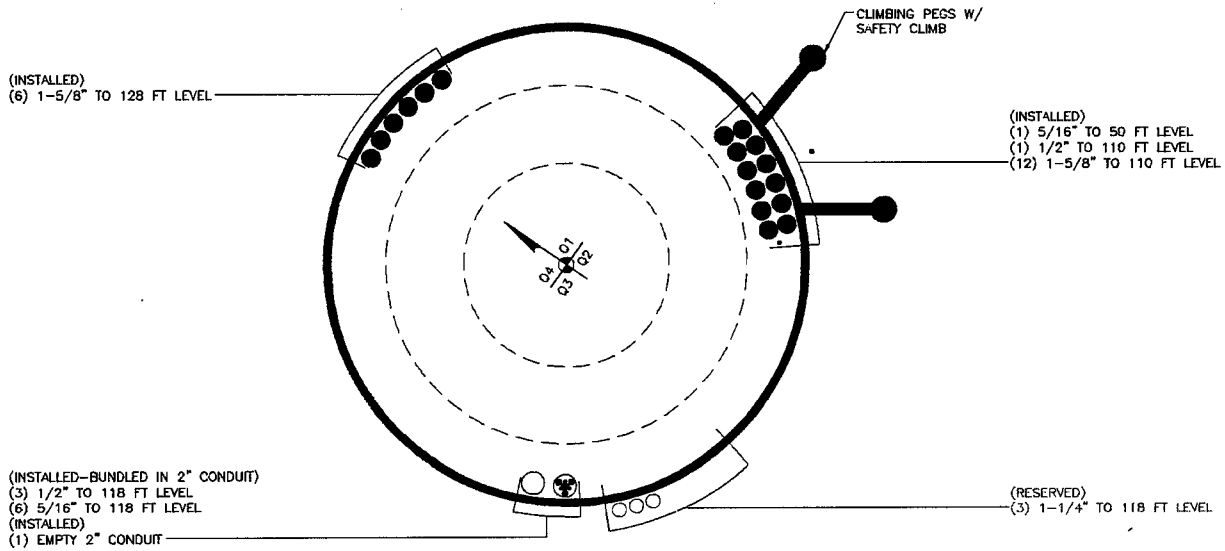
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	130 - 120.5	Pole	TP18.5x18.5x0.375	1	-2.00	597.73	11.4	Pass
L2	120.5 - 120	Pole	TP22x18.5x0.375	2	-2.00	597.73	11.4	Pass
L3	120 - 77	Pole	TP29.742x22x0.25	3	-8.91	1205.97	76.7	Pass
L4	77 - 37.75	Pole	TP36.308x28.5668x0.3125	4	-14.76	1840.62	94.6	Pass
L5	37.75 - 0	Pole	TP42.48x34.8729x0.375	5	-23.68	2643.11	97.0	Pass
							Summary	
							Pole (L5)	Pass
							RATING =	**97.0** **Pass**

Program Version 6.0.4.0 - 1/27/2012 File://FDH-SERVER/Projects/2013 Effective - Client Jobs/CROWNC_Crown Castle USA Inc/CT/876322_Tartaglia Property-CT/1326251400/SA, Verizon/Analysis/Tartaglia Property BU#876322.eri

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876322 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

Site Data

BU#: *876322*
Site Name: *Tartaglia Property*
App #:

Pole Manufacturer:	Other

Reactions		
Moment:	26.87	ft-kips
Axial:	2	kips
Shear:	3.64	kips
Elevation:	120	feet

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

Bolt Data			
Qty:	8		
Diameter (in.):	0.875	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty: 44.00
N/A:	55	<-- Disregard	
Circle (in.):	24		

Plate Data		
Diam:	26.25	in
Thick, t:	1.25	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	7.26	in

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

Pole Data		
Diam:	18.5	in
Thick:	0.375	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

			Rigid
Bolt Tension Capacity, **B**:	35.27	kips	Service, ASD
Max Bolt directly applied T:	6.47	Kips	Fty*ASIF
Min. PL "tc" for **B** cap. **w/o** Pry:	1.161	in	
Min PL "treq" for actual **T w/ Pry**:	0.363	in	
Min PL "t1" for actual **T w/o Pry**:	0.497	in	
T allowable w/o Prying:	35.27	kips	α'<0 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	6.47	kips	
Non-Prying Bolt Stress Ratio, T/B:	18.3%	Pass	

Exterior Flange Plate Results Flexural Check

			Rigid
Compression Side Plate Stress:	6.0	ksi	Service ASD
Allowable Plate Stress:	50.0	ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	11.9%	Pass	Comp. Y.L. Length:
No Prying			15.29
Tension Side Stress Ratio, (treq/t)^2:	8.5%	Pass	

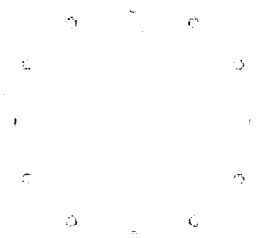
n/a

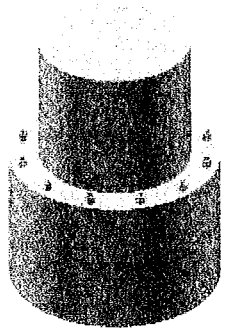
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a





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

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

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

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU #: *876322*
Site Name: *Tartgalia Property*
App #:

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	55	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	55	in
Thick:	3.5	in
Grade:	50	ksi
Clip Distance:	4.94	in

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

Pole Data		
Diam:	42.48	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	2175	ft-kips
Unfactored Axial, P:	24	kips
Unfactored Shear, V:	24	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	117.1 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	60.1% Pass

Base Plate Results — Flexural Check

Base Plate Stress:	35.3 ksi
Allowable PL Bending Stress:	50.0 ksi
Base Plate Stress Ratio:	70.7% Pass

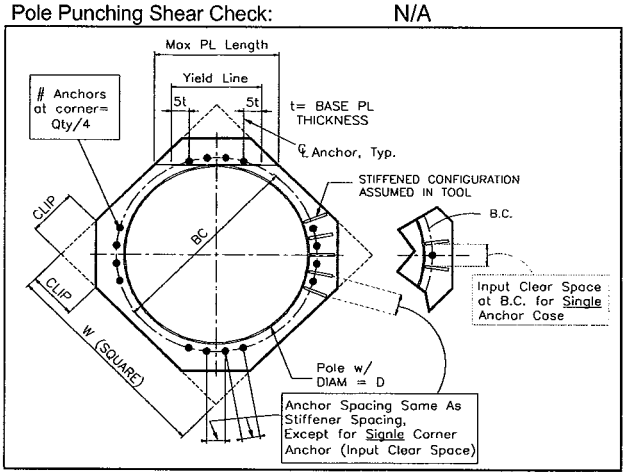
PL Ref. Data
Yield Line (in): 35.30
Max PL Length: 35.30

N/A - Unstiffened
Stiffener Results

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

Pole Results

Pole Punching Shear Check:	N/A



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

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

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

Site Data

BU#: *876322*
Site Name: *Targatlia Property*
App #:

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

Pier Properties

Concrete:

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

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.11	ft
Vert. Cage Diameter =	73.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	32	
As Total=	49.92	in^2
A s/ Aconc, Rho:	0.0090	0.90%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.90%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8839.70	kips
at Mu=(ϕ=0.65)Mn=	5309.39	ft-kips
Max Tu, (φ=0.9) Tn =	2695.68	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	2452.6	ft-kips (* **Note**)
Max. Service Shaft P:	24	kips
Max Axial Force Type:	Comp.	

(*) **Note:** Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	**Shaft Factored Loads**		
1.30	Mu:	3188.38	ft-kips
1.30	Pu:	31.2	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code= 2002

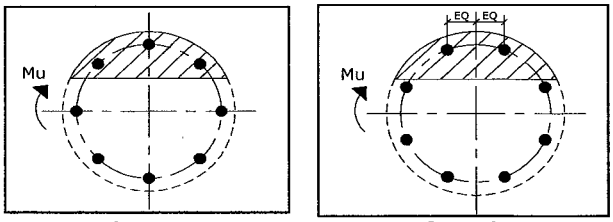
Seismic Properties

Seismic Design Category = B
Seismic Risk = **Low**

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

Results:

Governing Orientation Case: **2**



Case 1 Case 2

Dist. From Edge to Neutral Axis: **16.78** in
Extreme Steel Strain, εt: **0.0110**
εt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	31.20	kips
Drilled Shaft Moment Capacity, φMn:	**7432.61**	ft-kips
Drilled Shaft Superimposed Mu:	**3188.38**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**42.9%**

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FDH Engineering

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*****************************************************************************************
*                                                                                       *
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*                                                                                       *
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Project Title: BU 876322, Tartaglia Property
Project Notes: 1326251400

Calculation Method: Full 8CD

******* I N P U T D A T A

Pier Properties

Diameter (ft)	Distance of Top of Pier above Ground (ft)	Concrete Strength (ksi)	Steel Yield Strength (ksi)
7.00	0.50	3.00	60.00

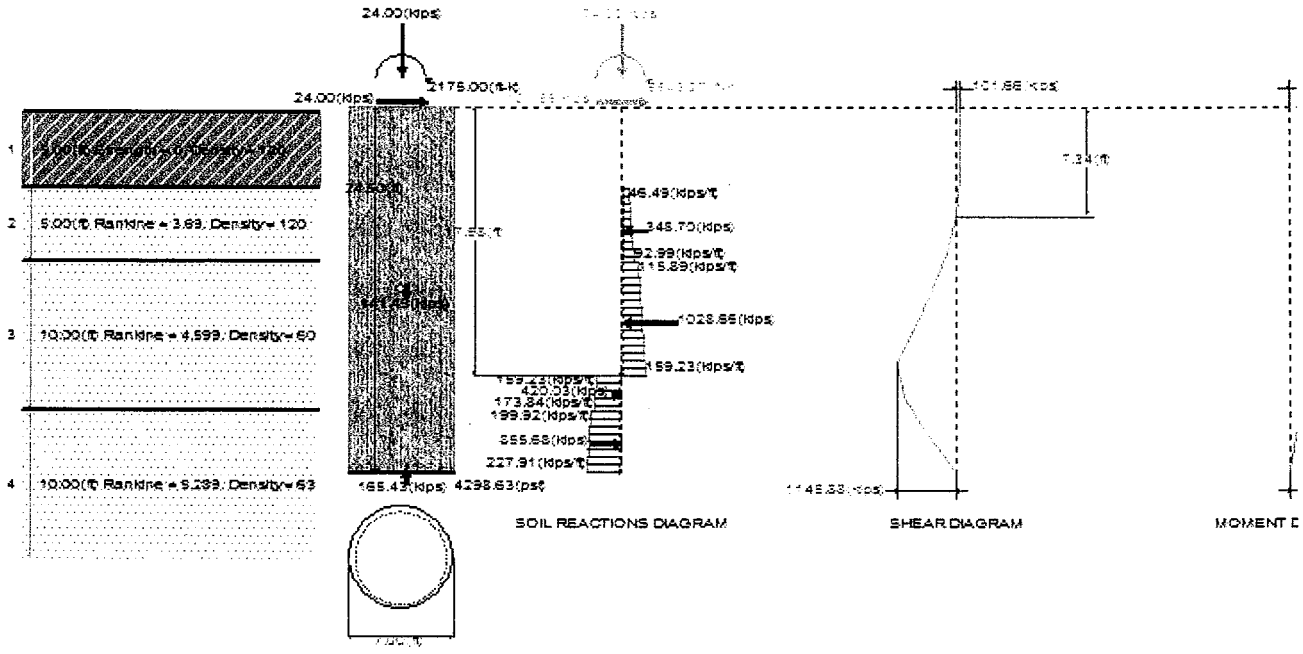
Soil Properties

Layer	Type	Thickness (ft)	Depth at Top of Layer (ft)	Density (lbs/ft^3)	CU (psf)	KP	PHI (deg)
1	Clay	5.00	0.00	120.0			
2	Sand	5.00	5.00	120.0		3.690	35.00
3	Sand	10.00	10.00	60.0		4.599	40.00
4	Sand	10.00	20.00	63.0		5.289	43.00

Design (Factored) Loads at Top of Pier

Moment (ft-k)	Axial Load (kips)	Shear Load (kips)	Additional Safety Factor Against Soil Failure
2175.0	24.0	24.00	4.20 soil capacity = 2/4.2 = 47.6%

******* R E S U L T S



Calculated Pier Properties

Length (ft)	Weight (kips)	Pressure Due To Axial Load (psf)	Pressure Due To Weight (psf)	Total End-Bearing Pressure (psf)
24.500	141.431	623.6	3675.0	4298.6

Ultimate Resisting Forces Along Pier

Type	Distance of Top of Layer to Top of Pier (ft)	Thickness (ft)	Density (lbs/ft^3)	CU (psf)	KP	Force (kips)	Arm (ft)
Clay	0.50	5.00	120.0			0.00	3.00
Sand	5.50	5.00	120.0		3.690	348.70	8.28
Sand	10.50	7.48	60.0		4.599	1028.66	14.44
Sand	17.98	2.52	60.0		4.599	-420.03	19.26
Sand	20.50	4.00	63.0		5.289	-855.68	22.54

Shear and Moments Along Pier

Distance below Top of Pier (ft)	Shear (with Safety Factor) (kips)	Moment (with Safety Factor) (ft-k)	Shear (without Safety Factor) (kips)	Moment (without Safety Factor) (ft-k)	
0.00	101.7	9643.3	24.2	2296.0	
2.45	101.7	9892.3	24.2	2355.3	
4.90	101.7	10141.4	24.2	2414.6	
7.35	-0.3	10301.1	-0.1	2452.6	MAX
9.80	-184.2	10086.5	-43.9	2401.5	
12.25	-458.7	9320.8	-109.2	2219.2	
14.70	-784.9	7804.4	-186.9	1858.2	
17.15	-1145.9	5446.3	-272.8	1296.7	
19.60	-1009.8	2588.5	-240.4	616.3	
22.05	-537.4	666.9	-127.9	158.8	
24.50	-0.0	0.0	-0.0	0.0	