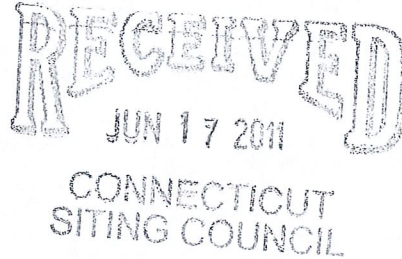


280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

June 16, 2011



Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Completion of Construction Activity**

EM-VER-113-110224 – 74 Goodrich Lane, Portland, Connecticut
EM-VER-152-110310 – 41 Manitock Hill, Waterford, Connecticut
EM-VER-003-110303 – Janowski Road, Ashford, Connecticut

Dear Ms. Roberts:

This letter will serve as notice that construction activity associated with the above-referenced facility modifications has been completed.

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

Sincerely,

A handwritten signature in black ink, appearing to read "Kenneth C. Baldwin".

Kenneth C. Baldwin



Law Offices

BOSTON

PROVIDENCE

HARTFORD

NEW LONDON

STAMFORD

WHITE PLAINS

NEW YORK CITY

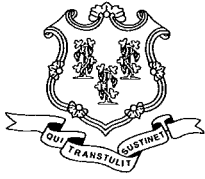
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Copy to:
Sandy M. Carter

11128396-v1



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 29, 2011

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

RE: **EM-VER-152-110310** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 41 Manitock Hill, Waterford, 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 Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated March 7, 2011. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Very truly yours,

Linda Roberts
Executive Director

LR/CDM/laf

c: The Honorable Daniel M. Steward, First Selectman, Town of Waterford
Thomas V. Wagner, Planning Director, Town of Waterford
Crown Castle USA, Inc.





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

Internet: ct.gov/csc

Daniel F. Caruso
Chairman

March 14, 2011

The Honorable Daniel M. Steward
First Selectman
Town of Waterford
Town Hall
15 Rope Ferry Road
Waterford, CT 06385

RE: **EM-VER-152-110310** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 41 Manitock Hill, Waterford, Connecticut.

Dear First Selectman Steward:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by March 28, 2011.

Thank you for your cooperation and consideration.

Very truly yours,

Linda Roberts
Executive Director

LR/jbw

Enclosure: Notice of Intent

c: Thomas V. Wagner, Planning Director, Town of Waterford

KENNETH C. BALDWIN

EM-VER-152-110310

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

March 7, 2011

ORIGINAL RECEIVED
MAR 10 2011
CONNECTICUT
SITING COUNCIL

Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap
41 Manitock Hill, Waterford, Connecticut**

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 107-foot level on the existing 136-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Connecticut Siting Council (“Council”) approved Cellco’s use of this tower in 2005. Cellco intends to remove its six PCS antennas and replace them with three (3) model BXA 185063/8CF PCS antennas and three (3) model BXA 70063/6CF LTE antennas. All new antennas will be installed at the same 107-foot level on the tower. Cellco will also install six (6) coax cable diplexers on its existing antenna platform. Attached behind Tab 1 of this filing are the specifications for the proposed replacement antennas and cable diplexers.

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 Daniel M. Steward, First Selectman for the Town of Waterford. The Town of Waterford is 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 any increase in the overall height of the existing tower. Cellco’s replacement antennas and diplexers will be located at the 107-foot level on the 136-foot tower.



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10927503-v1

Linda Roberts
March 7, 2011
Page 2

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

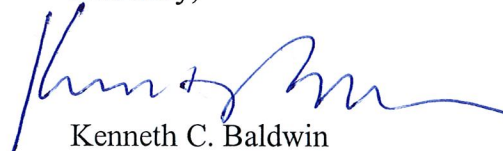
3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. The operation of the replacement antennas will not increase radio frequency (RF) power density levels at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table for the modified facility is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed modifications. (See 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:

Daniel M. Steward, Waterford First Selectman

Sandy M. Carter



BXA-185063/8CF

When ordering replace "___" with connector type.

Mechanical specifications

Length	1238 mm	48.8 in
Width	154 mm	6.1 in
Depth	80 mm	3.2 in
Depth with I-bracket	108 mm	4.3 in
4) Weight	4.5 kg	10.0 lbs
Wind Area		
Fore/Aft	0.19 m ²	2.1 ft ²
Side	0.10 m ²	1.1 ft ²
Rated Wind Velocity (Safety factor 2.0)		
	>322 km/hr	>200 mph
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	288 N	65 lbs
Side	170 N	38 lbs

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting and Downtilting

Mounting brackets attach to a pipe diameter of Ø50-102 mm (2.0-4.0 in).

Mounting bracket kit #26799997

Downtilt bracket kit #26799999

The downtilt bracket kit includes the mounting bracket kit.

Electrical specifications

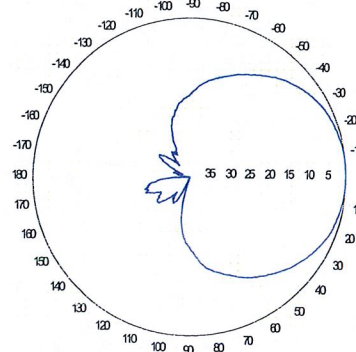
Frequency Range	1850-1990 MHz
Impedance	50Ω
3) Connector(s)	NE or E-DIN 2 ports / center or bottom
1) VSWR	≤ 1.4:1
Polarization	Slant ± 45°
1) Isolation Between Ports	< -30 dB
1) Gain	18.5 dBi
2) Power Rating	250 W
1) Half Power Angle	
H-Plane	63°
E-Plane	7°
1) Electrical Downtilt	0°
1) Null Fill	5%
Lightning Protection	Direct Ground

Patented Dipole Design: U.S. Patent No. 6,597,324 B2

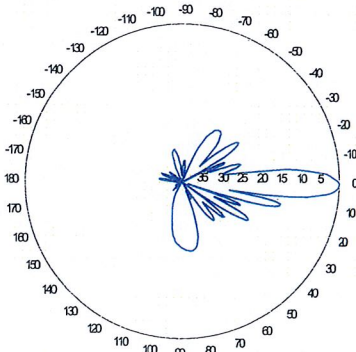
- 1) Typical values.
- 2) Power rating limited by connector only.
- 3) NE indicates an elongated N connector, E-DIN indicates an elongated DIN connector.
- 4) The antenna weight listed above does not include the bracket weight.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation pattern¹⁾



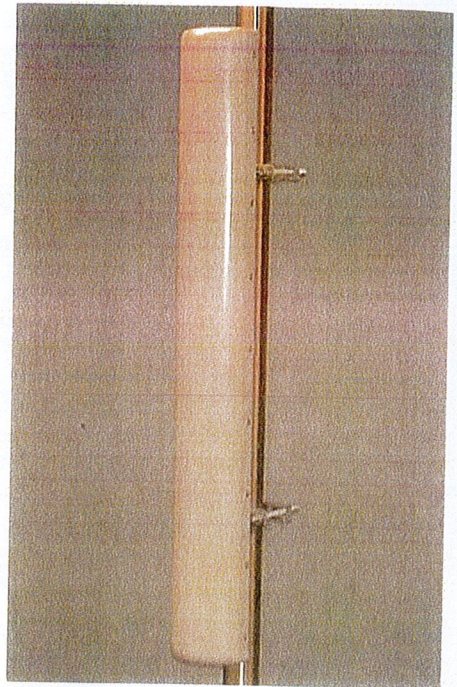
Horizontal



Vertical

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the Front-to-Back ratio.



Amphenol Antel's Exclusive 3T (True Transmission Line Technology) Antenna Design:

- Watercut brass feedline assembly for consistent performance.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

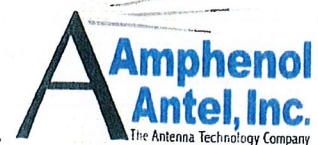
This Amphenol Antel antenna is under a five-year limited warranty for repair or replacement.

Antenna can be ordered with center-fed or bottom-fed connectors.

Center-fed: BXA-185063/8CF + (NE or E-DIN)
Bottom-fed: BXA-185063/8BF + (NE or E-DIN)

CF Denotes a Center-Fed Connector.

1850-1990 MHz



Revision Date: 7/11/07

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

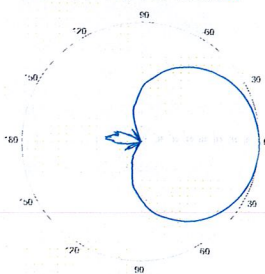
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics	696-900 MHz			
	696-806 MHz		806-900 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	500 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 m ²	Side: 0.24 m ²	Front: 5.5 ft ²	Side: 2.6 ft ²
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 Bracket Kit	36210003	50-160 mm	2.0-6.3 in	6.3 kg 14 lbs
3-Point Downtilt Bracket Kit (0-14°)	36210004	50-160 mm	2.0-6.3 in	7.3 kg 16 lbs
Downtilt Mounting Applications	A mounting bracket and downtilt bracket kit must be ordered for downtilt applications			
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP			

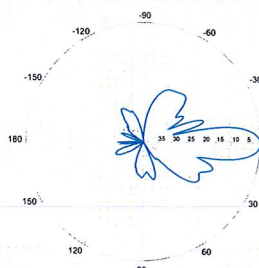


BXA-70063-6CF-EDIN-X



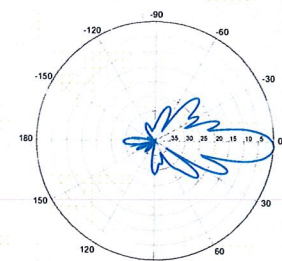
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

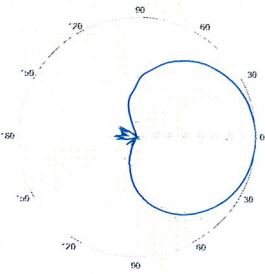


0° | Vertical | 750 MHz

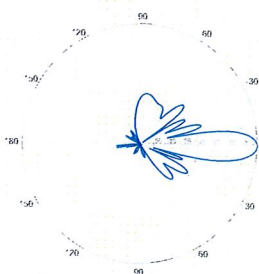
BXA-70063-6CF-EDIN-2



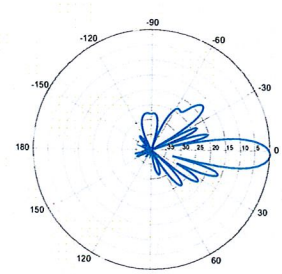
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



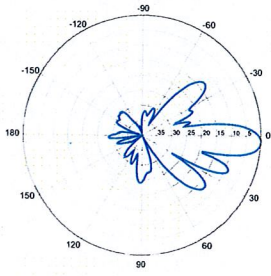
2° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

BXA-70063-6CF-EDIN-X

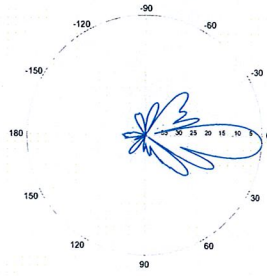
X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3



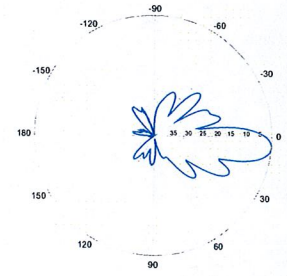
3° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-4

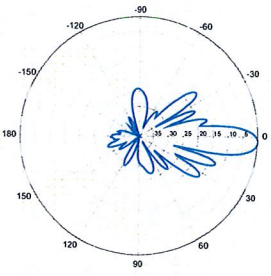


4° | Vertical | 750 MHz

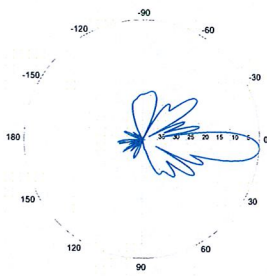
BXA-70063-6CF-EDIN-5



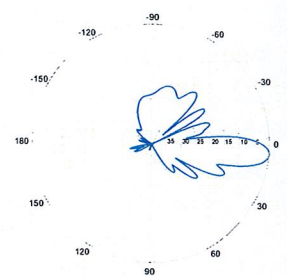
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

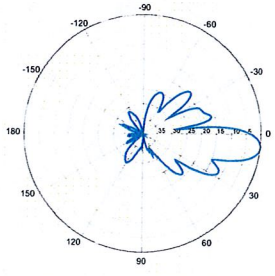


4° | Vertical | 850 MHz



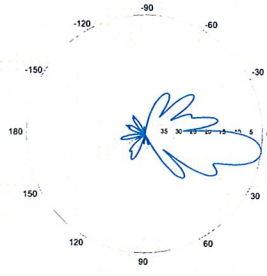
5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



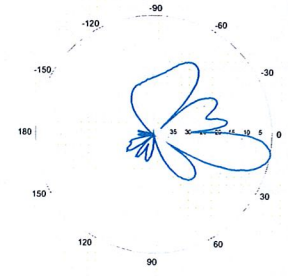
6° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-8

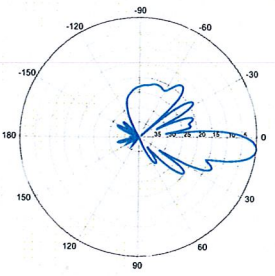


8° | Vertical | 750 MHz

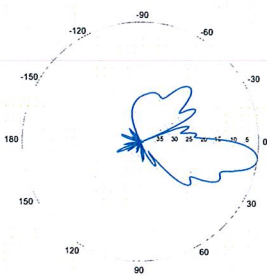
BXA-70063-6CF-EDIN-10



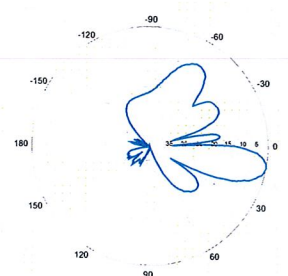
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.



ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Product Description

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.



Features/Benefits

- LTE ready design
- Extremely Low Insertion Loss
- High level of Rejection between bands – Protection against interferences
- Extremely High Power Handling Capability
- Integrated DC block/bypass versions available
- Very compact & small size design – Easy installation and reduced tower load
- In-line long-neck connectors for easy connection & waterproofing
- Exceptional reliability & environmental protection (IP 67)
- Equipped with 1 * Breathable Vent – Prevent any humidity inside the product
- Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)
- Grounding already provided through the mounting bracket
- Kit available for easy dual mount

Technical Specifications

Product Type	Diplexer/Cross Band Coupler
Frequency Band, MHz	698-2200
Configuration	Sharelite Single diplexer, outdoor, DC pass in the 1710-2170MHz path, with mounting hardware SEM2-1A
Mounting	Wall Mounting: With 4 screws (maximum 6mm diameter); Pole Mounting: With included clamp set 40-110mm (1.57-4.33)
Frequency Range Low Frequency Path, MHz	698-960
Frequency Range High Frequency Path, MHz	1710-2200
Return Loss All Ports Min/Typ, dB	19/23
Power Handling Continuous, Max, W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max, W	15000 in low frequency path & 8000 in high frequency path
Impedance, Ohms	50
Insertion Loss 698-960 MHz Path, Typ, dB	0.07
Insertion Loss 1710-2200MHz path, Typ, dB	0.13
Rejection Between Bands Min/Typ, dB	58/64@698-960MHz; 60/70@1710-2200MHz
IMP Level at the COM Port, Typ, dBm	-112 @ 2x43
DC Pass in Low Frequency Path	No
DC Pass in High Frequency Path	Yes
Temperature Range, °C (°F)	-40 to +60 (-40 to +140)
Environmental	ETSI 300-019-2-4 Class 4.1E
Ingress Protection	IP 67
Lightning Protection	EN/IEC61000-4-5 Level 4
Connectors	In-line long-neck 7-16-Female
Weight, kg (lb)	1.2 (2.6)
Shipping Weight, kg (lb)	3.2 (7) for 2 * single units in 1 * box, 9.8 (21.6) for 6 * units = 3 * Boxes in 1 * overwrap
Application	LTE 700MHz, GSM900/3G/UMTS, GSM900/GSM1800, Cellular 800/PCS
Dimensions, H x W x D, mm (in)	147 x 164 x 37 (5.8 x 6.5 x 1.5)
Shipping Dimensions, H x W x D, mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 2 * Single Units in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 6 * units = 3 * Boxes in 1 * overwrap
Volume, L	0.43
Housing	Aluminum

Notes

RFS The Clear Choice®

FD9R6004/2C-3L

Rev: --

Print Date: 16.02.2011

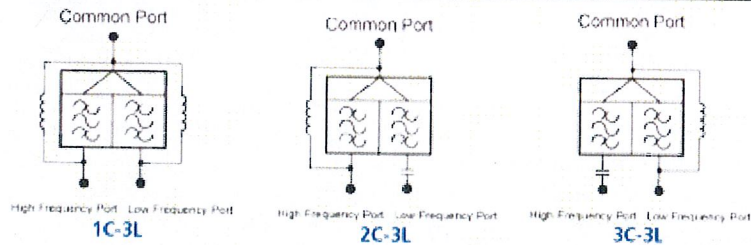
Please visit us on the internet at <http://www.rfsworld.com/>

Radio Frequency Systems



ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Selection Guide Diplexer 698-960 / 1710-2200MHz					
	Model Number	Full DC Pass	DC Pass High Band	DC Pass Low Band	Mounting Hardware Included
Single	FD9R6004/1C-3L				X
	FD9R6004/2C-3L				X
	FD9R6004/3C-3L				X
Dual	KIT-FD9R6004/1C-DL				X
	KIT-FD9R6004/2C-DL				X
	KIT-FD9R6004/3C-DL				X



The FD9R6004 Series is upgradeable to a Dual Diplexer kit by means of 2 diplexers and mounting hardware kits SEM2-1A and SEM2-3

Mounting Hardware and Ground Cable Ordering Information		
Model Number	Description	
SEM2-1A	Mounting Hardware, Pole mount ø40-110mm (Included with the Single and Dual Diplexer) Wall Screws M6 (Not included with the product)	
SEM2-3	Assembly kit for 2 pcs of FT9DW/xC-3L (Can be ordered separately but included with the Dual Diplexer Kit)	
CA020-2	Ground Cable, 2m, includes lugs (Optional)	
CA030-2	Ground Cable, 2m, includes lugs (Optional)	
SEM6	Mounting Hardware for 6 Diplexers, Tower Base (Optional)	

All information contained in the present datasheet is subject to confirmation at time of ordering

General		Power	Density					
Site Name: Waterford 2								
Tower Height: Verizon @ 107ft								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*Nextel	9	100	127	0.0201	851	0.5673	3.54%	
*Sprint	11	122	137	0.0257	1957.5	1.0000	2.57%	
*MetroPCS	3	443.61	89	0.0604	2140	1.0000	6.04%	
*Cingular UMTS	1	500	97	0.0191	880	0.5867	3.26%	
*Cingular GSM	3	654	97	0.0750	1900	1.0000	7.50%	
*T-Mobile GSM	8	139	117	0.0292	1945	1.0000	2.92%	
*T-Mobile UMTS	2	782	117	0.0411	2100	1.0000	4.11%	
Verizon	3	388	107	0.0366	1970	1.0000	3.66%	
Verizon	9	284	107	0.0803	869	0.5793	13.86%	
Verizon	1	832	107	0.0261	757	0.4973	5.25%	
* Source: Siting Council								52.70%

Date: January 14, 2011

Mitzi Parker
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277



Crown Castle
2000 Corporate Dr.
Canonsburg, PA 15317
724-416-2149

Subject: Structural Analysis Report

Carrier Designation:	Verizon Wireless Co-Locate	
	Carrier Site Number:	117854
	Carrier Site Name:	Waterford 2
Crown Castle Designation:	Crown Castle BU Number:	876338
	Crown Castle Site Name:	WATERFORD
	Crown Castle JDE Job Number:	148187
	Crown Castle Work Order Number:	380339
Engineering Firm Designation:	Crown Castle Project Number:	380339
Site Data:	41 Manltock Hill Road, Waterford, New London County, CT Latitude 41° 21' 16.42", Longitude -72° 9' 3.38" 136 Foot - Self Support Tower	

Dear Mitzi Parker,

Crown Castle 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 380339, in accordance with application 114805, revision 1.

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

LC1: Existing + Reserved + Proposed Equipment

Sufficient Capacity

Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

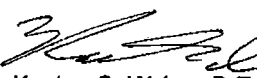
The analysis has been performed in accordance with the TIA/EIA-222-F standard and local code requirements based upon a wind speed of 85 mph fastest mile.

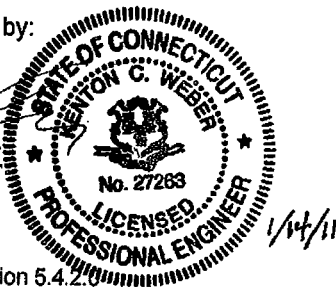
All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at Crown Castle 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.

Structural analysis prepared by: Shoab S. Ratnani, E.I.T./TS

Respectfully submitted by:


Kenton C. Weber, P.E.
Engineering Supervisor



RISA Tower Report - version 5.4.2.0

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1) INTRODUCTION

This tower is a 136 ft Self Support tower designed by PIROD MANUFACTURES INC. in February of 1999. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F. The tower was reworked in 2008 by Vertical Structures to accommodate additional loading.

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
107	107	3	antel	BXA-185063/8CF w/ Mount Pipe	-	-	-
		3	antel	BXA-70063/6CF w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			

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
136	137	6	decibel	980F90T2E-M w/ Mount Pipe	-	-	1
		3	m1a	MLA_ANTENNA w/ Mount Pipe	3	1-5/8	2
	136	1	tower mounts	Platform Mount [LP 405-1]	6	1-5/8	1
127	127	12	decibel	DB844H90E-XY w/ Mount Pipe	12	1-1/4	1
		1	tower mounts	Sector Mount [SM 411-3]			
117	117	-	-	-	2	1-5/8	5
		3	ems wireless	RR90-17-02DP w/ Mount Pipe	14	1-5/8	1
		3	rfs celwave	APX16DWV-16DWV-S-E-A20 w/Mount Pipe	-	-	3
		6	rfs celwave	ATMAA1412D-1A20	-	-	-
		1	tower mounts	Sector Mount [SM 411-3]	-	-	1
107	107	6	antel	LPA-185063/8CF w/ Mount Pipe	-	-	4
		6	antel	LPA-80063/4CF w/ Mount Pipe	12	1-5/8	1
		1	tower mounts	Sector Mount [SM 307-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		-	-	-	6	1-1/4	6
97	97	3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401	6	1-1/4	1
		1	tower mounts	Side Arm Mount [SO 201-3]			
87	89	3	kathrein	800 10504 w/ Mount Pipe	6	7/8	1
		3	kathrein	860 10118			
	87	1	tower mounts	Sector Mount [SM 104-3]	1	3/8	
80	80	1	tower mounts	Side Arm Mount [SO 701-1]	1	1/2	1
		1	unknown	GPS			
72	72	2	tower mounts	Side Arm Mount [SO 701-1]	2	1/2	1
		2	unknown	GPS			

Notes:

- 1) Existing Equipment
- 2) MLA Equipment, not controlling
- 3) Reserved Equipment
- 4) Equipment to be replaced with proposed
- 5) Abandoned Equipment to be removed
- 6) SLA Equipment, not controlling

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)
136	136	12	Allgon	7184.05	12	1 5/8
127	127	12	Swedcom	ALP9212	12	1 5/8
117	117	12	Swedcom	ALP9212	12	1 5/8
102	102	2	Decibel	DB810	2	1 5/8
80	80	2	-	GPS Antenna	2	1/2

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	SEA CONSULTANTS	2035622	CCISITES
4-POST-MODIFICATION INSPECTION	VERTICAL STRUCTURES	2376132	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PIROD	2068030	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PIROD	1441523	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	VERTICAL STRUCTURES	2125417	CCISITES

3.1) Analysis Method

RISATower (version 5.4.2.0), 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. Crown Castle 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
T1	136 - 130	Leg	1 1/2	3	-3.92	46.64	8.4	Pass
T2	130 - 110	Leg	2	23	28.43	67.69	42.0	Pass
T3	110 - 95	Leg	2 1/4	89	-68.40	128.26	53.3	Pass
T4	95 - 90	Leg	2 1/4	136	-85.74	147.86	58.0	Pass
T5	90 - 80	Leg	Pirod 105244 w/ 1 1/4" Reinforcement	166	-88.98	204.90	69.3	Pass
T6	80 - 60	Leg	Pirod 105217	175	-126.61	184.67	68.6	Pass
T7	60 - 40	Leg	Pirod 105218	190	-156.90	258.24	60.8	Pass
T8	40 - 20	Leg	Pirod 105218	205	-183.87	258.24	71.2	Pass
T9	20 - 0	Leg	Pirod 105219	220	-208.39	343.62	60.6	Pass
T1	136 - 130	Diagonal	3/4	18	-0.84	5.22	16.1	Pass
T2	130 - 110	Diagonal	7/8	36	-3.25	8.17	39.8	Pass
T3	110 - 95	Diagonal	1	95	-4.50	12.27	36.7	Pass
T4	95 - 90	Diagonal	1	145	-5.35	12.15	44.0	Pass
T5	90 - 80	Diagonal	L3x3x3/16	169	-6.23	16.99	36.7 51.3 (b)	Pass
T6	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	184	-6.23	9.92	62.8	Pass
T7	60 - 40	Diagonal	L3x3x3/16	193	-5.35	13.46	39.7 44.5 (b)	Pass
T8	40 - 20	Diagonal	L3x3x3/16	208	-5.45	11.02	49.4	Pass
T9	20 - 0	Diagonal	L3x3x5/16	223	-7.14	14.74	48.4	Pass
T1	136 - 130	Horizontal	3/4	16	-0.02	2.92	0.6	Pass
T2	130 - 110	Horizontal	7/8	45	-0.34	4.58	7.4	Pass
T3	110 - 95	Horizontal	7/8	106	-0.60	3.89	15.5	Pass
T4	95 - 90	Horizontal	7/8	137	-0.80	3.69	21.6	Pass
T4	95 - 90	Secondary Horizontal	1 1/2	154	-1.49	30.81	4.8	Pass
T1	136 - 130	Top Girt	7/8	5	-0.36	5.41	6.7	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail	
T2	130 - 110	Top Girt	1	26	-0.39	9.33	4.2	Pass	
T3	110 - 95	Top Girt	1	92	-0.96	7.39	13.0	Pass	
T1	136 - 130	Bottom Girt	7/8	7	-0.32	5.41	5.9	Pass	
T2	130 - 110	Bottom Girt	1	31	-1.43	7.39	19.4	Pass	
T4	95 - 90	Bottom Girt	1	140	-1.63	6.02	27.1	Pass	
							Summary		
							Leg (T8)	71.2	Pass
							Diagonal (T6)	62.8	Pass
							Horizontal (T4)	21.6	Pass
							Secondary Horizontal (T4)	4.8	Pass
							Top Girt (T3)	13.0	Pass
							Bottom Girt (T4)	27.1	Pass
							Bolt Checks	59.5	Pass
							RATING =	71.2	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
-	Anchor Rods	0	38.0	Pass
1	Base Foundation	0	62.4	Pass

Structure Rating (max from all components) =	71.2%
---	--------------

Notes:

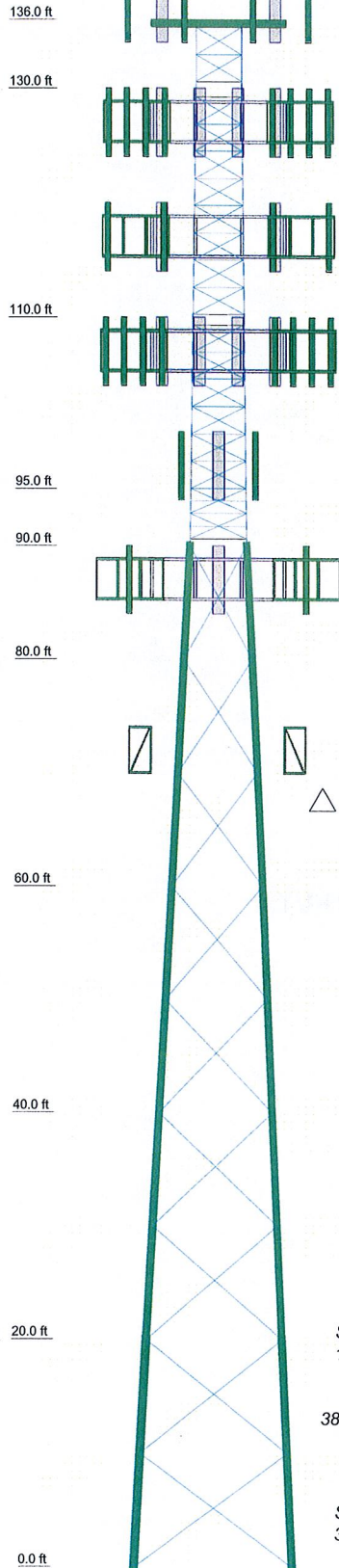
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity.

4.1) Recommendations

The tower is sufficient to carry the existing, reserved and proposed loads. No modifications are needed at this time.

APPENDIX A
RISA TOWER OUTPUT

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	12	10	8	6	5	4	0.2
Legs	SR 1 1/2	SR 2	SR 2 1/4	A	Pirol 105217	Pirol 105218	Pirol 105219	L3x3x3/16	L3x3x3/16	L3x3x3/16	L3x3x3/16	L3x3x3/16	L3x3x3/16	L3x3x3/16	L3x3x3/16	L3x3x3/16
Diagonals	SR 3/4	SR 7/8	SR 1	SR 1	A572-50	A36	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Diagonal Grade	SR 7/8	SR 1	SR 1	SR 1	A572-50	A36	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Top Girts	SR 7/8	SR 1	SR 1	SR 1	A572-50	A36	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Bottom Girts	SR 7/8	SR 1	SR 1	SR 1	A572-50	A36	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Horizontals	SR 3/4	SR 7/8	SR 1	SR 1	A572-50	A36	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sec. Horizontals	SR 3/4	SR 7/8	SR 1	SR 1	A572-50	A36	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Face Width (ft)	4	4.5	4.875	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11
# Panels @ (ft)	11 @ 2.375	11 @ 2.375	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889	6 @ 2.38889
Weight (K)	0.2	1.2	1.2	0.7	1.1	2.2	2.7	2.7	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 980F90T2E-M w/ Mount Pipe	136	BXA-70063/6CF w/ Mount Pipe	107
(2) 980F90T2E-M w/ Mount Pipe	136	(2) FD9R6004/2C-3L	107
(2) 980F90T2E-M w/ Mount Pipe	136	(2) LPA-80063/4CF w/ Mount Pipe	107
Platform Mount [LP 405-1]	136	BXA-185063/8CF w/ Mount Pipe	107
5' x 2' Pipe Mount	136	BXA-70063/6CF w/ Mount Pipe	107
5' x 2' Pipe Mount	136	(2) FD9R6004/2C-3L	107
5' x 2' Pipe Mount	136	Sector Mount [SM 307-3]	107
(4) DB844H90E-XY w/ Mount Pipe	127	7770.00 w/ Mount Pipe	97
(4) DB844H90E-XY w/ Mount Pipe	127	(2) LGP21401	97
(4) DB844H90E-XY w/ Mount Pipe	127	7770.00 w/ Mount Pipe	97
Sector Mount [SM 411-3]	127	(2) LGP21401	97
RR90-17-02DP w/ Mount Pipe	117	7770.00 w/ Mount Pipe	97
(2) ATMAA1412D-1A20	117	(2) LGP21401	97
APX16DWV-16DWV-S-E-A20 w/Mount Pipe	117	Side Arm Mount [SO 201-3]	97
APX16DWV-16DWV-S-E-A20 w/Mount Pipe	117	800 10504 w/ Mount Pipe	87
APX16DWV-16DWV-S-E-A20 w/Mount Pipe	117	800 10504 w/ Mount Pipe	87
RR90-17-02DP w/ Mount Pipe	117	860 10118	87
(2) ATMAA1412D-1A20	117	860 10118	87
RR90-17-02DP w/ Mount Pipe	117	800 10504 w/ Mount Pipe	87
(2) ATMAA1412D-1A20	117	860 10118	87
Sector Mount [SM 411-3]	117	860 10118	87
(2) LPA-80063/4CF w/ Mount Pipe	107	Sector Mount [SM 104-3]	87
BXA-185063/8CF w/ Mount Pipe	107	7'x2" Antenna Mount Pipe	87
BXA-70063/6CF w/ Mount Pipe	107	7'x2" Antenna Mount Pipe	87
(2) FD9R6004/2C-3L	107	7'x2" Antenna Mount Pipe	87
(2) LPA-80063/4CF w/ Mount Pipe	107	GPS	80
BXA-185063/8CF w/ Mount Pipe	107	Side Arm Mount [SO 701-1]	80
		GPS	72
		GPS	72
		Side Arm Mount [SO 701-1]	72
		Side Arm Mount [SO 701-1]	72

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pirol 105244 w/ 1 1/4" Reinforcement	B	2 @ 2.20833

MATERIAL STRENGTH

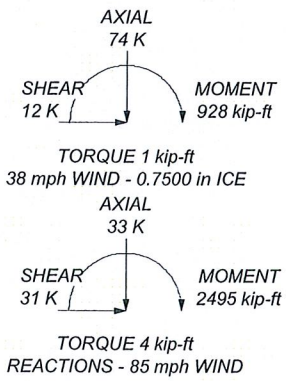
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in New London 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: 71.2%

MAX. CORNER REACTIONS AT BASE:

DOWN: 217 K
 UPLIFT: -191 K
 SHEAR: 22 K



<p>Crown Castle 2000 Corporate Drive Canonsburg, PA 15317 Shaping the Wireless World Phone: (724) 416-2879 FAX: (724) 416-4879</p>	Job: BU 876338	
	Project:	App'd:
	Client: Crown Castle	Drawn by: tstyran
	Code: TIA/EIA-222-F	Date: 01/13/11
	Path: R:\ISA Models - Letters\Work Area\ISATraining\876338\876338.dwg	Scale: NTS Dwg No. E-1

RISATower Crown Castle 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2879 FAX: (724) 416-4879	Job BU 876338	Page 1 of 29
	Project	Date 17:02:37 01/13/11
	Client Crown Castle	Designed by tstyran

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 136' above the ground line.

The base of the tower is set at an elevation of 0' above the ground line.

The face width of the tower is 4' at the top and 14' at the base.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in New London 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.

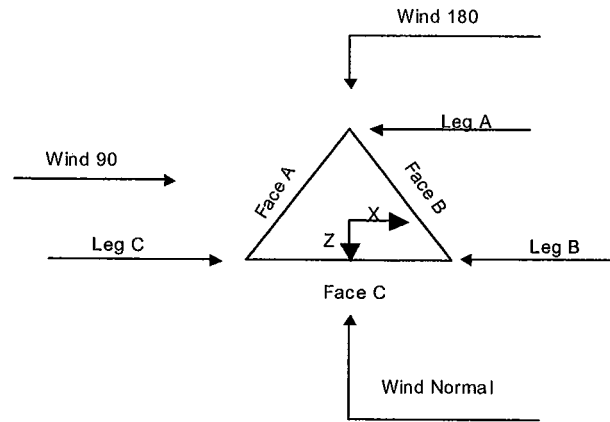
Stress ratio used in tower member design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys √ Escalate Ice Always Use Max Kz Use Special Wind Profile √ Include Bolts In Member Capacity Leg Bolts Are At Top Of Section √ Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination | <ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area √ Use Clear Spans For KL/r Retension Guys To Initial Tension √ Bypass Mast Stability Checks √ Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. Autocalc Torque Arm Areas SR Members Have Cut Ends √ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing | <ul style="list-style-type: none"> Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules √ Calculate Redundant Bracing Forces Ignore Redundant Members in FEA √ SR Leg Bolts Resist Compression √ All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feedline Torque √ Include Angle Block Shear Check <li style="padding-left: 20px;">Poles Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets |
|--|--|---|

RISATower Crown Castle 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2879 FAX: (724) 416-4879	Job BU 876338	Page 2 of 29
	Project	Date 17:02:37 01/13/11
	Client Crown Castle	Designed by tstyran



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	<i>ft</i>			<i>ft</i>		<i>ft</i>
T1	136'-130'			4'	1	6'
T2	130'-110'			4'	1	20'
T3	110'-95'			4'6"	1	15'
T4	95'-90'			4'10-9/16"	1	5'
T5	90'-80'			5'	1	10'
T6	80'-60'			6'	1	20'
T7	60'-40'			8'	1	20'
T8	40'-20'			10'	1	20'
T9	20'-0'			12'	1	20'

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	<i>ft</i>	<i>ft</i>				<i>in</i>	<i>in</i>
T1	136'-130'	2'4-9/16"	X Brace	No	Steps	8.5000	6.5000
T2	130'-110'	2'4-9/16"	X Brace	No	Steps	9.5000	2.5000
T3	110'-95'	2'4-11/16"	X Brace	No	Steps	8.0000	0.0000
T4	95'-90'	2'2-17/32"	X Brace	No	Yes	0.0000	7.0000
T5	90'-80'	10'	X Brace	No	No	0.0000	0.0000
T6	80'-60'	10'	X Brace	No	No	0.0000	0.0000

RISA Tower Crown Castle 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2879 FAX: (724) 416-4879	Job	BU 876338	Page	3 of 29
	Project		Date	17:02:37 01/13/11
	Client	Crown Castle	Designed by	tstyrar

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T7	60'-40'	10'	X Brace	No	No	0.0000	0.0000
T8	40'-20'	10'	X Brace	No	No	0.0000	0.0000
T9	20'-0'	10'	X Brace	No	No	0.0000	0.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 136'-130'	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 130'-110'	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T3 110'-95'	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T4 95'-90'	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T5 90'-80'	Truss Leg	Pirod 105244 w/ 1 1/4" Reinforcement	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T6 80'-60'	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 60'-40'	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T8 40'-20'	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T9 20'-0'	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 136'-130'	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 130'-110'	Solid Round	1	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T3 110'-95'	Solid Round	1	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T4 95'-90'	Solid Round		A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

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Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 136'-130'	None	Solid Round		A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 130'-110'	None	Solid Round		A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T3 110'-95'	None	Solid Round		A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T4 95'-90'	None	Solid Round		A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T4 95'-90'	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry (cont'd)

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
T1 136'-130'	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 130'-110'	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 110'-95'	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 95'-90'	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 90'-80'	0.67	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 80'-60'	1.44	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 60'-40'	1.44	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 40'-20'	1.44	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 20'-0'	1.44	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry (cont'd)

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Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 136'-130'	No	Yes	1	1	1	1	1	1	1	1
T2 130'-110'	No	Yes	1	1	1	1	1	1	1	1
T3 110'-95'	No	Yes	1	1	1	1	1	1	1	1
T4 95'-90'	No	Yes	1	1	1	1	1	1	1	1
T5 90'-80'	No	Yes	1	1	1	1	1	1	1	1
T6 80'-60'	No	Yes	1	1	1	1	1	1	1	1
T7 60'-40'	No	Yes	1	1	1	1	1	1	1	1
T8 40'-20'	No	Yes	1	1	1	1	1	1	1	1
T9 20'-0'	No	Yes	1	1	1	1	1	1	1	1

¹Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.

Tower Section Geometry (cont'd)

Tower Elevation ft	Truss-Leg K Factors					
	Truss-Legs Used As Leg Members			Truss-Legs Used As Inner Members		
	Leg Panels	X Brace Diagonals	Z Brace Diagonals	Leg Panels	X Brace Diagonals	Z Brace Diagonals
T5 90'-80'	1	1	1	1	0.5	0.85
T6 80'-60'	1	1	1	1	0.5	0.85
T7 60'-40'	1	1	1	1	0.5	0.85
T8 40'-20'	1	1	1	1	0.5	0.85
T9 20'-0'	1	1	1	1	0.5	0.85

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 136'-130'	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 130'-110'	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 110'-95'	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 95'-90'	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 90'-80'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 80'-60'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 60'-40'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 40'-20'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1

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Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF7-50A(1-5/8")	A	No	Ar (Leg)	97' - 0'	0.0000	0.1	24	6	1.0000	1.9800		0.82
LDF7-50A(1-5/8")	A	No	Ar (Leg)	107' - 97'	0.0000	0.1	18	6	1.0000	1.9800		0.82
LDF7-50A(1-5/8")	A	No	Ar (Leg)	136' - 107'	0.0000	0.1	6	6	1.0000	1.9800		0.82
LDF4-50A(1/2")	A	No	Ar (Leg)	80' - 0'	0.0000	0.1	1	1	0.6300	0.6300		0.15
T-Brackets (Af)	A	No	Af (Leg)	136' - 0'	0.0000	0.1	1	1	1.0000	1.0000	4.0000	8.40
T-Brackets (Af)	B	No	Af (Leg)	117' - 0'	0.0000	0.1	1	1	1.0000	1.0000	4.0000	8.40
LDF7-50A(1-5/8")	B	No	Ar (Leg)	117' - 0'	0.0000	0.1	14	7	1.0000	1.9800		0.82
FSJ2-50(3/8")	B	Yes	Ar (CfAe)	87' - 0'	0.0000	0	1	1	0.4250	0.4250		0.08
FXL 780	B	Yes	Ar (CfAe)	87' - 0'	0.0000	0	6	6	1.0900	1.0900		0.25
PE(7/8)												
Feedline Ladder (Af)	B	Yes	Af (CfAe)	87' - 0'	0.0000	0	1	1	3.0000	3.0000	12.0000	8.40
LDF4-50A(1/2")	C	No	Ar (Leg)	72' - 0'	0.0000	0.1	2	2	0.6300	0.6300		0.15
LDF6-50A(1-1/4")	C	No	Ar (Leg)	127' - 0'	0.0000	0.1	12	6	1.0000	1.5500		0.66
T-Brackets (Af)	C	No	Af (Leg)	72' - 0'	0.0000	0.1	1	1	1.0000	1.0000	4.0000	8.40

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	136'-130'	A	5.940	0.500	0.000	0.000	0.08
		B	5.940	0.500	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	130'-110'	A	32.975	1.667	0.000	0.000	0.27
		B	27.885	2.250	0.000	0.000	0.14
		C	21.260	0.583	0.000	0.000	0.13
T3	110'-95'	A	26.475	1.250	0.000	0.000	0.33
		B	32.175	2.500	0.000	0.000	0.30
		C	28.950	1.250	0.000	0.000	0.12
T4	95'-90'	A	8.825	0.417	0.000	0.000	0.14
		B	10.725	0.833	0.000	0.000	0.10
		C	9.650	0.417	0.000	0.000	0.04
T5	90'-80'	A	17.650	0.833	0.000	0.000	0.28
		B	25.513	3.417	0.000	0.000	0.27
		C	19.300	0.833	0.000	0.000	0.08
T6	80'-60'	A	37.610	2.667	0.000	0.000	0.56
		B	55.558	8.333	0.000	0.000	0.60

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Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	$C_A A_A$ In Face ft^2	$C_A A_A$ Out Face ft^2	Weight K
T7	60'-40'	C	39.860	2.667	0.000	0.000	0.26
		A	38.450	3.333	0.000	0.000	0.56
		B	55.558	8.333	0.000	0.000	0.60
T8	40'-20'	C	40.700	3.333	0.000	0.000	0.33
		A	38.450	3.333	0.000	0.000	0.56
		B	55.558	8.333	0.000	0.000	0.60
T9	20'-0'	C	40.700	3.333	0.000	0.000	0.33
		A	38.450	3.333	0.000	0.000	0.56
		B	55.558	8.333	0.000	0.000	0.60
		C	40.700	3.333	0.000	0.000	0.33

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	$C_A A_A$ In Face ft^2	$C_A A_A$ Out Face ft^2	Weight K
T1	136'-130'	A	0.887	1.877	8.541	0.000	0.000	0.21
		B		1.877	8.541	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	130'-110'	A	0.876	10.896	46.508	0.000	0.000	0.69
		B		8.396	40.140	0.000	0.000	0.43
		C		6.854	29.757	0.000	0.000	0.59
T3	110'-95'	A	0.859	8.709	37.245	0.000	0.000	1.01
		B		9.246	46.339	0.000	0.000	0.91
		C		8.709	40.970	0.000	0.000	0.52
T4	95'-90'	A	0.849	2.885	12.409	0.000	0.000	0.46
		B		3.065	15.435	0.000	0.000	0.30
		C		2.885	13.651	0.000	0.000	0.17
T5	90'-80'	A	0.840	5.742	24.809	0.000	0.000	0.92
		B		8.945	39.612	0.000	0.000	0.80
		C		5.742	27.292	0.000	0.000	0.34
T6	80'-60'	A	0.821	17.413	52.928	0.000	0.000	1.85
		B		23.855	86.606	0.000	0.000	1.74
		C		13.627	57.895	0.000	0.000	0.84
T7	60'-40'	A	0.788	18.495	55.020	0.000	0.000	1.83
		B		23.314	86.389	0.000	0.000	1.71
		C		14.817	59.987	0.000	0.000	0.93
T8	40'-20'	A	0.750	17.983	54.850	0.000	0.000	1.81
		B		22.675	86.133	0.000	0.000	1.68
		C		14.433	59.817	0.000	0.000	0.91
T9	20'-0'	A	0.750	17.983	54.850	0.000	0.000	1.81
		B		22.675	86.133	0.000	0.000	1.68
		C		14.433	59.817	0.000	0.000	0.91

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	136'-130'	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	130'-110'	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000

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Section	Elevation	Face	A_R	A_R	A_F	A_F
			ft^2	Ice ft^2	ft^2	Ice ft^2
T3	110'-95'	C	0.000	0.000	0.000	0.000
		A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
T4	95'-90'	C	0.000	0.000	0.000	0.000
		A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
T5	90'-80'	C	0.000	0.000	0.000	0.000
		A	0.000	0.000	0.000	0.000
		B	0.000	0.693	0.602	1.237
T6	80'-60'	C	0.000	0.000	0.000	0.000
		A	0.000	0.000	0.000	0.000
		B	0.000	1.623	1.211	2.472
T7	60'-40'	C	0.000	0.000	0.000	0.000
		A	0.000	0.000	0.000	0.000
		B	0.000	1.321	1.244	2.514
T8	40'-20'	C	0.000	0.000	0.000	0.000
		A	0.000	0.000	0.000	0.000
		B	0.000	1.123	1.123	2.245
T9	20'-0'	C	0.000	0.000	0.000	0.000
		A	0.000	0.000	0.000	0.000
		B	0.000	1.048	1.048	2.095
		C	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation	CP_x	CP_z	CP_x	CP_z
		in	in	Ice in	Ice in
T1	136'-130'	0.0000	-6.5011	0.0000	-4.0796
T2	130'-110'	-0.7116	-1.9761	-0.5315	-1.3389
T3	110'-95'	1.2688	-0.2108	0.9193	-0.0960
T4	95'-90'	1.1698	-0.1944	0.8135	-0.0842
T5	90'-80'	1.7644	-0.5988	1.4376	-0.4631
T6	80'-60'	2.2256	-0.9346	1.7508	-0.9099
T7	60'-40'	2.4536	-0.9926	1.9747	-1.0038
T8	40'-20'	2.9604	-1.1987	2.4393	-1.2241
T9	20'-0'	3.3810	-1.3696	2.7924	-1.4022

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	$C_A A_A$	$C_A A_A$	Weight
			Horz	Lateral			Front	Side	
			ft	ft	$^\circ$	ft	ft^2	ft^2	K
(2) 980F90T2E-M w/ Mount Pipe	A	From Leg	4.00	0.0000	136'	No Ice	3.99	3.72	0.03
			0'			1/2" Ice	4.45	4.58	0.07
			1'			1" Ice	4.90	5.32	0.11
						2" Ice	5.82	6.85	0.22
						4" Ice	7.98	10.10	0.55

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
(2) 980F90T2E-M w/ Mount Pipe	B	From Leg	4.00		0.0000	136'	No Ice	3.99	3.72	0.03
			0'				1/2" Ice	4.45	4.58	0.07
			1'				1" Ice	4.90	5.32	0.11
							2" Ice	5.82	6.85	0.22
							4" Ice	7.98	10.10	0.55
(2) 980F90T2E-M w/ Mount Pipe	C	From Leg	4.00		0.0000	136'	No Ice	3.99	3.72	0.03
			0'				1/2" Ice	4.45	4.58	0.07
			1'				1" Ice	4.90	5.32	0.11
							2" Ice	5.82	6.85	0.22
							4" Ice	7.98	10.10	0.55
Platform Mount [LP 405-1]	C	None			0.0000	136'	No Ice	20.80	20.80	1.80
							1/2" Ice	28.10	28.10	2.07
							1" Ice	35.40	35.40	2.33
							2" Ice	50.00	50.00	2.86
							4" Ice	79.20	79.20	3.93
5' x 2' Pipe Mount	A	From Leg	4.00		0.0000	136'	No Ice	1.00	1.00	0.03
			0'				1/2" Ice	1.39	1.39	0.04
			0'				1" Ice	1.70	1.70	0.05
							2" Ice	2.35	2.35	0.08
							4" Ice	3.78	3.78	0.20
5' x 2' Pipe Mount	B	From Leg	4.00		0.0000	136'	No Ice	1.00	1.00	0.03
			0'				1/2" Ice	1.39	1.39	0.04
			0'				1" Ice	1.70	1.70	0.05
							2" Ice	2.35	2.35	0.08
							4" Ice	3.78	3.78	0.20
5' x 2' Pipe Mount	C	From Leg	4.00		0.0000	136'	No Ice	1.00	1.00	0.03
			0'				1/2" Ice	1.39	1.39	0.04
			0'				1" Ice	1.70	1.70	0.05
							2" Ice	2.35	2.35	0.08
							4" Ice	3.78	3.78	0.20
**										
(4) DB844H90E-XY w/ Mount Pipe	A	From Leg	4.00		0.0000	127'	No Ice	3.30	4.92	0.03
			0'				1/2" Ice	3.69	5.60	0.07
			0'				1" Ice	4.12	6.28	0.12
							2" Ice	5.01	7.71	0.23
							4" Ice	6.92	10.83	0.56
(4) DB844H90E-XY w/ Mount Pipe	B	From Leg	4.00		0.0000	127'	No Ice	3.30	4.92	0.03
			0'				1/2" Ice	3.69	5.60	0.07
			0'				1" Ice	4.12	6.28	0.12
							2" Ice	5.01	7.71	0.23
							4" Ice	6.92	10.83	0.56
(4) DB844H90E-XY w/ Mount Pipe	C	From Leg	4.00		0.0000	127'	No Ice	3.30	4.92	0.03
			0'				1/2" Ice	3.69	5.60	0.07
			0'				1" Ice	4.12	6.28	0.12
							2" Ice	5.01	7.71	0.23
							4" Ice	6.92	10.83	0.56
Sector Mount [SM 411-3]	C	None			0.0000	127'	No Ice	21.88	21.88	1.07
							1/2" Ice	30.68	30.68	1.48
							1" Ice	39.48	39.48	1.90
							2" Ice	57.08	57.08	2.73
							4" Ice	92.28	92.28	4.40
**										
RR90-17-02DP w/ Mount Pipe	A	From Leg	4.00		0.0000	117'	No Ice	4.59	3.32	0.03
			0'				1/2" Ice	5.09	4.09	0.07
			0'				1" Ice	5.58	4.78	0.11
							2" Ice	6.59	6.23	0.22
							4" Ice	8.73	9.31	0.56

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	Client	Crown Castle	Designed by	tstyran

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	K	
(2) ATMAA1412D-1A20	A	From Leg	4.00	0'	0.0000	117'	No Ice	1.17	0.47	0.01
							1/2" Ice	1.31	0.57	0.02
							1" Ice	1.47	0.69	0.03
							2" Ice	1.81	0.95	0.06
							4" Ice	2.58	1.57	0.14
APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	A	From Leg	4.00	0'	0.0000	117'	No Ice	7.27	3.29	0.06
							1/2" Ice	7.73	3.92	0.10
							1" Ice	8.21	4.57	0.16
							2" Ice	9.18	5.92	0.28
							4" Ice	11.23	8.88	0.65
APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	B	From Leg	4.00	0'	0.0000	117'	No Ice	7.27	3.29	0.06
							1/2" Ice	7.73	3.92	0.10
							1" Ice	8.21	4.57	0.16
							2" Ice	9.18	5.92	0.28
							4" Ice	11.23	8.88	0.65
APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	C	From Leg	4.00	0'	0.0000	117'	No Ice	7.27	3.29	0.06
							1/2" Ice	7.73	3.92	0.10
							1" Ice	8.21	4.57	0.16
							2" Ice	9.18	5.92	0.28
							4" Ice	11.23	8.88	0.65
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.00	0'	0.0000	117'	No Ice	4.59	3.32	0.03
							1/2" Ice	5.09	4.09	0.07
							1" Ice	5.58	4.78	0.11
							2" Ice	6.59	6.23	0.22
							4" Ice	8.73	9.31	0.56
(2) ATMAA1412D-1A20	B	From Leg	4.00	0'	0.0000	117'	No Ice	1.17	0.47	0.01
							1/2" Ice	1.31	0.57	0.02
							1" Ice	1.47	0.69	0.03
							2" Ice	1.81	0.95	0.06
							4" Ice	2.58	1.57	0.14
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.00	0'	0.0000	117'	No Ice	4.59	3.32	0.03
							1/2" Ice	5.09	4.09	0.07
							1" Ice	5.58	4.78	0.11
							2" Ice	6.59	6.23	0.22
							4" Ice	8.73	9.31	0.56
(2) ATMAA1412D-1A20	C	From Leg	4.00	0'	0.0000	117'	No Ice	1.17	0.47	0.01
							1/2" Ice	1.31	0.57	0.02
							1" Ice	1.47	0.69	0.03
							2" Ice	1.81	0.95	0.06
							4" Ice	2.58	1.57	0.14
Sector Mount [SM 411-3]	C	None			0.0000	117'	No Ice	21.88	21.88	1.07
							1/2" Ice	30.68	30.68	1.48
							1" Ice	39.48	39.48	1.90
							2" Ice	57.08	57.08	2.73
							4" Ice	92.28	92.28	4.40
**										
(2) LPA-80063/4CF w/ Mount Pipe	A	From Leg	4.00	0'	0.0000	107'	No Ice	7.25	7.26	0.04
							1/2" Ice	7.72	7.96	0.10
							1" Ice	8.20	8.67	0.18
							2" Ice	9.19	10.16	0.34
							4" Ice	11.32	13.39	0.80
BXA-185063/8CF w/ Mount Pipe	A	From Leg	4.00	0'	0.0000	107'	No Ice	3.18	3.00	0.03
							1/2" Ice	3.56	3.61	0.06
							1" Ice	3.96	4.24	0.09
							2" Ice	4.86	5.53	0.19
							4" Ice	6.77	8.42	0.47
BXA-70063/6CF w/ Mount	A	From Leg	4.00		0.0000	107'	No Ice	7.98	5.70	0.04

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
Pipe				0'		1/2" Ice	8.62	6.85	0.10
				0'		1" Ice	9.23	7.71	0.17
						2" Ice	10.47	9.50	0.33
						4" Ice	13.08	13.26	0.80
(2) FD9R6004/2C-3L	A	From Leg	4.00	0.0000	107'	No Ice	0.37	0.08	0.00
			0'			1/2" Ice	0.45	0.14	0.01
			0'			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) LPA-80063/4CF w/ Mount Pipe	B	From Leg	4.00	0.0000	107'	No Ice	7.25	7.26	0.04
			0'			1/2" Ice	7.72	7.96	0.10
			0'			1" Ice	8.20	8.67	0.18
						2" Ice	9.19	10.16	0.34
						4" Ice	11.32	13.39	0.80
BXA-185063/8CF w/ Mount Pipe	B	From Leg	4.00	0.0000	107'	No Ice	3.18	3.00	0.03
			0'			1/2" Ice	3.56	3.61	0.06
			0'			1" Ice	3.96	4.24	0.09
						2" Ice	4.86	5.53	0.19
						4" Ice	6.77	8.42	0.47
BXA-70063/6CF w/ Mount Pipe	B	From Leg	4.00	0.0000	107'	No Ice	7.98	5.70	0.04
			0'			1/2" Ice	8.62	6.85	0.10
			0'			1" Ice	9.23	7.71	0.17
						2" Ice	10.47	9.50	0.33
						4" Ice	13.08	13.26	0.80
(2) FD9R6004/2C-3L	B	From Leg	4.00	0.0000	107'	No Ice	0.37	0.08	0.00
			0'			1/2" Ice	0.45	0.14	0.01
			0'			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) LPA-80063/4CF w/ Mount Pipe	C	From Leg	4.00	0.0000	107'	No Ice	7.25	7.26	0.04
			0'			1/2" Ice	7.72	7.96	0.10
			0'			1" Ice	8.20	8.67	0.18
						2" Ice	9.19	10.16	0.34
						4" Ice	11.32	13.39	0.80
BXA-185063/8CF w/ Mount Pipe	C	From Leg	4.00	0.0000	107'	No Ice	3.18	3.00	0.03
			0'			1/2" Ice	3.56	3.61	0.06
			0'			1" Ice	3.96	4.24	0.09
						2" Ice	4.86	5.53	0.19
						4" Ice	6.77	8.42	0.47
BXA-70063/6CF w/ Mount Pipe	C	From Leg	4.00	0.0000	107'	No Ice	7.98	5.70	0.04
			0'			1/2" Ice	8.62	6.85	0.10
			0'			1" Ice	9.23	7.71	0.17
						2" Ice	10.47	9.50	0.33
						4" Ice	13.08	13.26	0.80
(2) FD9R6004/2C-3L	C	From Leg	4.00	0.0000	107'	No Ice	0.37	0.08	0.00
			0'			1/2" Ice	0.45	0.14	0.01
			0'			1" Ice	0.54	0.20	0.01
						2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
Sector Mount [SM 307-3]	C	None		0.0000	107'	No Ice	26.22	26.22	1.62
						1/2" Ice	36.28	36.28	2.15
						1" Ice	46.34	46.34	2.68
						2" Ice	66.46	66.46	3.73
						4" Ice	106.70	106.70	5.85
**									
7770.00 w/ Mount Pipe	A	From Leg	1.00	0.0000	97'	No Ice	6.12	4.25	0.06
			0'			1/2" Ice	6.63	5.01	0.10

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} _{Front}	C _{AA} _{Side}	Weight
			Horz	Lateral					
			ft	ft					
			0'			1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) LGP21401	A	From Leg	1.00	0.0000	97'	No Ice	1.29	0.23	0.01
			0'			1/2" Ice	1.45	0.31	0.02
			0'			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
7770.00 w/ Mount Pipe	B	From Leg	1.00	0.0000	97'	No Ice	6.12	4.25	0.06
			0'			1/2" Ice	6.63	5.01	0.10
			0'			1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) LGP21401	B	From Leg	1.00	0.0000	97'	No Ice	1.29	0.23	0.01
			0'			1/2" Ice	1.45	0.31	0.02
			0'			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
7770.00 w/ Mount Pipe	C	From Leg	1.00	0.0000	97'	No Ice	6.12	4.25	0.06
			0'			1/2" Ice	6.63	5.01	0.10
			0'			1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) LGP21401	C	From Leg	1.00	0.0000	97'	No Ice	1.29	0.23	0.01
			0'			1/2" Ice	1.45	0.31	0.02
			0'			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
Side Arm Mount [SO 201-3]	C	None		0.0000	97'	No Ice	5.71	5.71	0.29
						1/2" Ice	7.91	7.91	0.35
						1" Ice	10.11	10.11	0.41
						2" Ice	14.51	14.51	0.54
						4" Ice	23.31	23.31	0.79
**									
800 10504 w/ Mount Pipe	A	From Leg	4.00	0.0000	87'	No Ice	3.59	3.18	0.04
			0'			1/2" Ice	4.01	3.91	0.07
			2'			1" Ice	4.42	4.58	0.11
						2" Ice	5.34	5.98	0.21
						4" Ice	7.38	8.98	0.51
800 10504 w/ Mount Pipe	B	From Leg	4.00	0.0000	87'	No Ice	3.59	3.18	0.04
			0'			1/2" Ice	4.01	3.91	0.07
			2'			1" Ice	4.42	4.58	0.11
						2" Ice	5.34	5.98	0.21
						4" Ice	7.38	8.98	0.51
860 10118	A	From Leg	4.00	0.0000	87'	No Ice	0.17	0.14	0.00
			0'			1/2" Ice	0.24	0.21	0.00
			2'			1" Ice	0.32	0.28	0.00
						2" Ice	0.50	0.46	0.01
						4" Ice	0.96	0.91	0.05
860 10118	B	From Leg	4.00	0.0000	87'	No Ice	0.17	0.14	0.00
			0'			1/2" Ice	0.24	0.21	0.00
			2'			1" Ice	0.32	0.28	0.00
						2" Ice	0.50	0.46	0.01
						4" Ice	0.96	0.91	0.05
800 10504 w/ Mount Pipe	C	From Leg	4.00	0.0000	87'	No Ice	3.59	3.18	0.04
			0'			1/2" Ice	4.01	3.91	0.07
			2'			1" Ice	4.42	4.58	0.11

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Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral	Vert					
			ft	ft	ft					
860 10118	C	From Leg	4.00	0.0000	87'	2" Ice	5.34	5.98	0.21	
						4" Ice	7.38	8.98	0.51	
						No Ice	0.17	0.14	0.00	
						1/2" Ice	0.24	0.21	0.00	
						1" Ice	0.32	0.28	0.00	
						2" Ice	0.50	0.46	0.01	
Sector Mount [SM 104-3]	C	None	0.0000	87'	4" Ice	0.96	0.91	0.05		
					No Ice	30.02	30.02	0.95		
					1/2" Ice	30.02	30.02	1.40		
					1" Ice	30.02	30.02	1.86		
					2" Ice	30.02	30.02	2.76		
					4" Ice	30.02	30.02	4.57		
7'x2" Antenna Mount Pipe	A	From Leg	4.00	0.0000	87'	No Ice	1.66	1.66	0.03	
						1/2" Ice	2.39	2.39	0.04	
						1" Ice	2.83	2.83	0.06	
						2" Ice	3.71	3.71	0.10	
						4" Ice	5.58	5.58	0.27	
						No Ice	1.66	1.66	0.03	
7'x2" Antenna Mount Pipe	B	From Leg	4.00	0.0000	87'	1/2" Ice	2.39	2.39	0.04	
						1" Ice	2.83	2.83	0.06	
						2" Ice	3.71	3.71	0.10	
						4" Ice	5.58	5.58	0.27	
						No Ice	1.66	1.66	0.03	
						1/2" Ice	2.39	2.39	0.04	
7'x2" Antenna Mount Pipe	C	From Leg	4.00	0.0000	87'	1" Ice	2.83	2.83	0.06	
						2" Ice	3.71	3.71	0.10	
						4" Ice	5.58	5.58	0.27	
						No Ice	1.66	1.66	0.03	
						1/2" Ice	2.39	2.39	0.04	
						1" Ice	2.83	2.83	0.06	
**	GPS	A	From Leg	3.00	0.0000	80'	No Ice	0.17	0.17	0.00
1/2" Ice							0.24	0.24	0.00	
1" Ice							0.31	0.31	0.00	
2" Ice							0.48	0.48	0.01	
4" Ice							0.92	0.92	0.05	
No Ice							0.85	1.67	0.07	
Side Arm Mount [SO 701-1]	A	From Leg	0.00	0.0000	80'	1/2" Ice	1.14	2.34	0.08	
						1" Ice	1.43	3.01	0.09	
						2" Ice	2.01	4.35	0.12	
						4" Ice	3.17	7.03	0.18	
						No Ice	0.85	1.67	0.07	
						1/2" Ice	1.14	2.34	0.08	
**	GPS	B	From Leg	4.00	0.0000	72'	No Ice	0.17	0.17	0.00
1/2" Ice							0.24	0.24	0.00	
1" Ice							0.31	0.31	0.00	
2" Ice							0.48	0.48	0.01	
4" Ice							0.92	0.92	0.05	
No Ice							0.17	0.17	0.00	
GPS	C	From Leg	4.00	0.0000	72'	1/2" Ice	0.24	0.24	0.00	
						1" Ice	0.31	0.31	0.00	
						2" Ice	0.48	0.48	0.01	
						4" Ice	0.92	0.92	0.05	
						No Ice	0.85	1.67	0.07	
						1/2" Ice	1.14	2.34	0.08	
Side Arm Mount [SO 701-1]	B	From Leg	0.00	0.0000	72'	1" Ice	1.43	3.01	0.09	
						2" Ice	2.01	4.35	0.12	
						4" Ice	3.17	7.03	0.18	
						No Ice	0.85	1.67	0.07	
						1/2" Ice	1.14	2.34	0.08	
						1" Ice	1.43	3.01	0.09	
Side Arm Mount [SO 701-1]	C	From Leg	0.00	0.0000	72'	No Ice	0.85	1.67	0.07	
						1/2" Ice	1.14	2.34	0.08	
						1" Ice	1.43	3.01	0.09	

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
**						2" Ice 4" Ice	2.01 3.17	4.35 7.03	0.12 0.18

Truss-Leg Properties

Section Designation	Area in ²	Area Ice in ²	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in ²
Pirod 105244 w/ 1 1/4" Reinforcement	2261.8218	4388.8287	0.57	0.79	7.8535	15.2390	5.8293
Pirod 105217	2296.2363	4895.6001	0.56	0.88	7.9730	16.9986	5.3014
Pirod 105218	2425.3141	4973.0624	0.69	0.85	8.4212	17.2676	7.2158
Pirod 105218	2425.3141	4788.5245	0.69	0.78	8.4212	16.6268	7.2158
Pirod 105219	2597.9095	5128.1841	1.03	0.84	9.0205	17.8062	9.4248

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

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Comb. No.	Description
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
T1	136 - 130	Leg	Max Tension	4	2.32	0.19	-0.12
			Max. Compression	2	-3.92	0.00	0.14
			Max. Mx	5	-1.48	-0.36	-0.00
			Max. My	2	-1.62	-0.00	0.37
			Max. Vy	5	0.66	-0.12	0.00
			Max. Vx	2	-0.68	0.00	0.14
		Diagonal	Max Tension	3	0.83	0.00	0.00
			Max. Compression	5	-0.84	0.00	0.00
			Max. Mx	26	0.27	-0.00	-0.00
			Max. My	4	-0.69	-0.00	-0.00
			Max. Vy	16	0.00	-0.00	0.00
			Max. Vx	5	-0.00	0.00	0.00
		Horizontal	Max Tension	8	0.11	0.00	0.00
			Max. Compression	2	-0.02	0.00	0.00
			Max. Mx	14	0.07	0.01	0.00
			Max. My	5	0.04	0.00	-0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	5	0.00	0.00	0.00
		Top Girt	Max Tension	6	0.35	0.00	0.00
			Max. Compression	4	-0.36	0.00	0.00
			Max. Mx	14	-0.01	0.01	0.00
			Max. My	5	0.02	0.00	-0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	5	0.00	0.00	0.00
		Bottom Girt	Max Tension	8	0.35	0.00	0.00
			Max. Compression	2	-0.32	0.00	0.00
			Max. Mx	14	0.00	0.01	0.00
			Max. My	5	0.03	0.00	-0.00
Max. Vy	14		-0.01	0.00	0.00		
Max. Vx	5		0.00	0.00	0.00		
T2	130 - 110	Leg	Max Tension	4	28.43	0.90	-0.03
			Max. Compression	2	-33.13	-0.36	-0.00
			Max. Mx	2	-30.35	-0.92	-0.01
			Max. My	5	-2.35	0.01	-0.75
			Max. Vy	2	-2.68	-0.36	-0.00
			Max. Vx	5	-2.18	0.00	-0.30
		Diagonal	Max Tension	9	3.25	0.00	0.00
			Max. Compression	3	-3.25	0.00	0.00
			Max. Mx	22	1.10	-0.00	-0.00
			Max. My	11	-2.48	-0.00	-0.00
			Max. Vy	22	0.01	-0.00	-0.00
			Max. Vx	4	0.00	0.00	0.00

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft		
T3	110 - 95	Horizontal	Max Tension	8	0.47	0.00	0.00		
			Max. Compression	2	-0.34	0.00	0.00		
			Max. Mx	14	0.14	0.01	0.00		
			Max. My	5	0.06	0.00	-0.00		
			Max. Vy	14	-0.01	0.00	0.00		
			Max. Vx	5	-0.00	0.00	0.00		
		Top Girt	Max Tension	2	0.42	0.00	0.00	0.00	
			Max. Compression	8	-0.39	0.00	0.00		
			Max. Mx	14	-0.01	0.01	0.00		
			Max. My	6	-0.21	0.00	0.00		
			Max. Vy	14	-0.01	0.00	0.00		
			Max. Vx	6	-0.00	0.00	0.00		
		Bottom Girt	Max Tension	4	1.43	0.00	0.00	0.00	
			Max. Compression	6	-1.43	0.00	0.00		
			Max. Mx	14	0.04	0.01	0.00		
			Max. My	12	-0.60	0.00	-0.00		
			Max. Vy	14	-0.01	0.00	0.00		
			Max. Vx	12	0.00	0.00	0.00		
		Leg	Leg	Horizontal	Max Tension	4	60.84	-0.10	-0.01
					Max. Compression	2	-68.40	-0.03	-0.00
					Max. Mx	2	-35.74	1.43	0.01
					Max. My	5	-2.45	-0.00	1.16
					Max. Vy	2	-2.69	1.43	0.01
					Max. Vx	5	-2.19	-0.00	1.16
				Diagonal	Max Tension	13	4.46	0.00	0.00
					Max. Compression	7	-4.50	0.00	0.00
					Max. Mx	2	3.71	-0.01	0.00
					Max. My	3	-3.56	-0.00	-0.00
					Max. Vy	15	0.01	-0.01	0.00
					Max. Vx	3	0.00	-0.00	-0.00
		Top Girt	Top Girt	Horizontal	Max Tension	8	0.76	0.00	0.00
					Max. Compression	2	-0.60	0.00	0.00
Max. Mx	14				0.17	0.01	0.00		
Max. My	12				-0.21	0.00	-0.00		
Max. Vy	14				-0.01	0.00	0.00		
Max. Vx	12				0.00	0.00	0.00		
Top Girt	Max Tension			10	1.02	0.00	0.00		
	Max. Compression			12	-0.96	0.00	0.00		
	Max. Mx			14	0.02	0.01	0.00		
	Max. My			6	-0.53	0.00	0.00		
	Max. Vy			14	-0.01	0.00	0.00		
	Max. Vx			6	-0.00	0.00	0.00		
T4	95 - 90	Leg	Max Tension	4	77.32	1.39	-0.01		
			Max. Compression	2	-85.74	1.62	-0.01		
			Max. Mx	10	-85.40	1.63	-0.03		
			Max. My	5	-4.29	-0.02	-0.95		
			Max. Vy	10	-5.29	1.63	-0.03		
			Max. Vx	5	-3.16	0.01	0.89		
		Diagonal	Max Tension	13	5.25	0.00	0.00		
			Max. Compression	7	-5.35	0.00	0.00		
			Max. Mx	3	2.95	-0.01	-0.00		
			Max. My	7	-5.32	0.00	-0.00		
			Max. Vy	19	0.01	-0.01	-0.00		
			Max. Vx	7	0.00	0.00	-0.00		
		Horizontal	Max Tension	8	0.94	0.00	0.00		
			Max. Compression	2	-0.80	0.00	0.00		
			Max. Mx	14	0.12	0.01	0.00		
			Max. My	12	-0.35	0.00	-0.00		
			Max. Vy	14	-0.01	0.00	0.00		
			Max. Vx	12	0.00	0.00	0.00		
		Secondary	Secondary	Max Tension	2	1.49	0.00	0.00	

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Horizontal	Max. Compression	2	-1.49	0.00	0.00
			Max. Mx	14	0.15	0.03	0.00
			Max. My	6	1.48	0.00	0.00
			Max. Vy	14	-0.02	0.00	0.00
			Max. Vx	6	-0.00	0.00	0.00
		Bottom Girt	Max Tension	8	1.60	0.00	0.00
			Max. Compression	2	-1.63	0.00	0.00
			Max. Mx	14	0.38	0.01	0.00
			Max. My	12	-0.69	0.00	-0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	12	0.00	0.00	0.00
T5	90 - 80	Leg	Max Tension	4	80.29	0.33	-0.04
			Max. Compression	2	-88.98	12.38	-0.03
			Max. Mx	4	79.91	-12.43	0.05
			Max. My	5	-4.83	0.03	9.67
			Max. Vy	8	1.51	-12.43	0.05
			Max. Vx	5	-1.50	0.03	9.67
		Diagonal	Max Tension	5	5.76	0.10	0.01
			Max. Compression	6	-6.23	0.00	0.00
			Max. Mx	4	5.41	0.10	-0.02
			Max. My	13	-4.50	-0.07	-0.04
			Max. Vy	5	-0.02	0.09	-0.02
			Max. Vx	13	0.01	0.00	0.00
T6	80 - 60	Leg	Max Tension	4	114.56	-1.71	-0.01
			Max. Compression	2	-126.61	10.36	-0.08
			Max. Mx	4	98.47	-11.05	0.05
			Max. My	13	-5.13	-0.32	8.98
			Max. Vy	10	-1.16	11.04	-0.04
			Max. Vx	11	0.21	0.06	-6.58
		Diagonal	Max Tension	7	5.56	0.06	0.00
			Max. Compression	7	-6.23	0.00	0.00
			Max. Mx	2	4.18	0.09	-0.01
			Max. My	5	-5.38	-0.06	0.01
			Max. Vy	2	-0.02	0.09	-0.01
			Max. Vx	5	-0.00	-0.06	0.01
T7	60 - 40	Leg	Max Tension	4	141.13	-2.61	-0.00
			Max. Compression	2	-156.90	8.49	-0.06
			Max. Mx	2	-142.51	9.23	-0.06
			Max. My	5	-7.28	0.01	6.48
			Max. Vy	10	-0.77	9.23	-0.01
			Max. Vx	11	0.34	0.01	-6.46
		Diagonal	Max Tension	7	5.00	0.08	-0.00
			Max. Compression	7	-5.39	0.00	0.00
			Max. Mx	2	4.06	0.11	-0.01
			Max. My	12	4.10	0.09	-0.01
			Max. Vy	15	-0.03	0.07	-0.00
			Max. Vx	25	0.00	0.00	0.00
T8	40 - 20	Leg	Max Tension	4	164.48	-2.46	0.00
			Max. Compression	2	-183.87	8.52	-0.10
			Max. Mx	6	-183.47	8.52	0.10
			Max. My	3	-8.43	-0.15	-6.50
			Max. Vy	10	-0.71	8.52	0.00
			Max. Vx	9	-0.28	-0.15	6.47
		Diagonal	Max Tension	7	5.01	0.00	0.00
			Max. Compression	7	-5.45	0.00	0.00
			Max. Mx	2	4.08	0.10	-0.00
			Max. My	25	2.12	0.05	-0.01
			Max. Vy	15	-0.03	0.07	-0.01
			Max. Vx	25	0.00	0.00	0.00
T9	20 - 0	Leg	Max Tension	4	184.59	-2.71	0.01

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	2	-208.39	3.80	-0.06
			Max. Mx	8	174.47	-6.91	0.07
			Max. My	3	-10.16	-0.39	-9.92
			Max. Vy	23	-0.76	6.63	0.04
			Max. Vx	3	0.78	-0.39	-9.92
		Diagonal	Max Tension	8	6.35	0.00	0.00
			Max. Compression	6	-7.14	0.00	0.00
			Max. Mx	2	3.48	0.13	-0.01
			Max. My	3	-6.01	-0.03	-0.02
			Max. Vy	15	-0.04	0.10	0.01
			Max. Vx	3	0.00	-0.03	-0.02

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	10	215.81	18.85	-10.88
	Max. H _x	10	215.81	18.85	-10.88
	Max. H _z	4	-191.28	-16.82	9.70
	Min. Vert	4	-191.28	-16.82	9.70
	Min. H _x	4	-191.28	-16.82	9.70
	Min. H _z	10	215.81	18.85	-10.88
Leg B	Max. Vert	6	216.41	-18.78	-11.03
	Max. H _x	12	-190.67	16.74	9.81
	Max. H _z	12	-190.67	16.74	9.81
	Min. Vert	12	-190.67	16.74	9.81
	Min. H _x	6	216.41	-18.78	-11.03
	Min. H _z	6	216.41	-18.78	-11.03
Leg A	Max. Vert	2	216.87	0.16	21.79
	Max. H _x	13	187.14	0.18	18.66
	Max. H _z	2	216.87	0.16	21.79
	Min. Vert	8	-190.19	-0.14	-19.39
	Min. H _x	6	-91.00	-0.22	-9.48
	Min. H _z	8	-190.19	-0.14	-19.39

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	33.31	-0.00	0.00	-6.22	-4.20	0.00
Dead+Wind 0 deg - No Ice	33.31	0.00	-31.40	-2494.78	-4.23	3.67
Dead+Wind 30 deg - No Ice	33.31	15.37	-26.63	-2134.26	-1232.95	2.11
Dead+Wind 60 deg - No Ice	33.31	26.44	-15.26	-1229.64	-2123.39	0.07
Dead+Wind 90 deg - No Ice	33.31	30.75	0.00	-6.26	-2461.66	-1.98
Dead+Wind 120 deg - No Ice	33.31	27.19	15.70	1238.01	-2159.55	-3.58
Dead+Wind 150 deg - No Ice	33.31	15.37	26.63	2121.76	-1232.94	-4.01
Dead+Wind 180 deg - No Ice	33.31	0.00	30.53	2440.53	-4.23	-3.49
Dead+Wind 210 deg - No Ice	33.31	-15.37	26.63	2121.77	1224.49	-2.11
Dead+Wind 240 deg - No Ice	33.31	-27.19	15.70	1238.01	2151.10	-0.09
Dead+Wind 270 deg - No Ice	33.31	-30.75	0.00	-6.27	2453.22	1.98
Dead+Wind 300 deg - No Ice	33.31	-26.44	-15.26	-1229.65	2114.94	3.42

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Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 330 deg - No Ice	33.31	-15.37	-26.63	-2134.26	1224.50	4.01
Dead+Ice+Temp	73.88	-0.00	0.00	-21.27	-11.47	0.00
Dead+Wind 0 deg+Ice+Temp	73.88	-0.00	-11.70	-927.45	-11.54	-1.20
Dead+Wind 30 deg+Ice+Temp	73.88	5.63	-9.75	-786.11	-453.02	0.61
Dead+Wind 60 deg+Ice+Temp	73.88	9.61	-5.55	-458.62	-768.91	-0.07
Dead+Wind 90 deg+Ice+Temp	73.88	11.26	0.00	-21.33	-894.61	-0.74
Dead+Wind 120 deg+Ice+Temp	73.88	10.14	5.85	431.64	-796.29	-1.29
Dead+Wind 150 deg+Ice+Temp	73.88	5.63	9.75	743.27	-453.14	-1.36
Dead+Wind 180 deg+Ice+Temp	73.88	-0.00	11.10	853.07	-11.55	-1.12
Dead+Wind 210 deg+Ice+Temp	73.88	-5.63	9.75	743.27	430.05	-0.61
Dead+Wind 240 deg+Ice+Temp	73.88	-10.14	5.85	431.64	773.20	0.09
Dead+Wind 270 deg+Ice+Temp	73.88	-11.26	0.00	-21.33	871.53	0.74
Dead+Wind 300 deg+Ice+Temp	73.88	-9.61	-5.55	-458.62	745.83	1.19
Dead+Wind 330 deg+Ice+Temp	73.88	-5.63	-9.75	-786.12	429.93	1.36
Dead+Wind 0 deg - Service	33.31	0.00	-10.87	-867.36	-4.22	1.27
Dead+Wind 30 deg - Service	33.31	5.32	-9.21	-742.61	-429.40	0.72
Dead+Wind 60 deg - Service	33.31	9.15	-5.28	-429.58	-737.52	0.02
Dead+Wind 90 deg - Service	33.31	10.64	0.00	-6.25	-854.57	-0.68
Dead+Wind 120 deg - Service	33.31	9.41	5.43	424.30	-750.03	-1.24
Dead+Wind 150 deg - Service	33.31	5.32	9.21	730.11	-429.40	-1.40
Dead+Wind 180 deg - Service	33.31	0.00	10.56	840.41	-4.22	-1.21
Dead+Wind 210 deg - Service	33.31	-5.32	9.21	730.11	420.95	-0.72
Dead+Wind 240 deg - Service	33.31	-9.41	5.43	424.30	741.59	-0.03
Dead+Wind 270 deg - Service	33.31	-10.64	0.00	-6.25	846.13	0.68
Dead+Wind 300 deg - Service	33.31	-9.15	-5.28	-429.58	729.07	1.18
Dead+Wind 330 deg - Service	33.31	-5.32	-9.21	-742.61	420.95	1.40

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-33.31	0.00	0.00	33.31	-0.00	0.000%
2	0.00	-33.31	-31.40	-0.00	33.31	31.40	0.000%
3	15.37	-33.31	-26.63	-15.37	33.31	26.63	0.000%
4	26.44	-33.31	-15.26	-26.44	33.31	15.26	0.000%
5	30.75	-33.31	0.00	-30.75	33.31	-0.00	0.000%
6	27.19	-33.31	15.70	-27.19	33.31	-15.70	0.000%
7	15.37	-33.31	26.63	-15.37	33.31	-26.63	0.000%
8	0.00	-33.31	30.53	0.00	33.31	-30.53	0.000%
9	-15.37	-33.31	26.63	15.37	33.31	-26.63	0.000%
10	-27.19	-33.31	15.70	27.19	33.31	-15.70	0.000%
11	-30.75	-33.31	0.00	30.75	33.31	-0.00	0.000%
12	-26.44	-33.31	-15.26	26.44	33.31	15.26	0.000%
13	-15.37	-33.31	-26.63	15.37	33.31	26.63	0.000%
14	0.00	-73.88	0.00	0.00	73.88	-0.00	0.001%
15	0.00	-73.88	-11.70	0.00	73.88	11.70	0.000%
16	5.63	-73.88	-9.75	-5.63	73.88	9.75	0.000%
17	9.61	-73.88	-5.55	-9.61	73.88	5.55	0.000%
18	11.26	-73.88	0.00	-11.26	73.88	-0.00	0.000%
19	10.14	-73.88	5.85	-10.14	73.88	-5.85	0.000%
20	5.63	-73.88	9.75	-5.63	73.88	-9.75	0.000%
21	0.00	-73.88	11.10	0.00	73.88	-11.10	0.000%
22	-5.63	-73.88	9.75	5.63	73.88	-9.75	0.000%
23	-10.14	-73.88	5.85	10.14	73.88	-5.85	0.000%
24	-11.26	-73.88	0.00	11.26	73.88	-0.00	0.000%
25	-9.61	-73.88	-5.55	9.61	73.88	5.55	0.000%
26	-5.63	-73.88	-9.75	5.63	73.88	9.75	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
27	0.00	-33.31	-10.87	0.00	33.31	10.87	0.000%
28	5.32	-33.31	-9.21	-5.32	33.31	9.21	0.000%
29	9.15	-33.31	-5.28	-9.15	33.31	5.28	0.000%
30	10.64	-33.31	0.00	-10.64	33.31	-0.00	0.000%
31	9.41	-33.31	5.43	-9.41	33.31	-5.43	0.000%
32	5.32	-33.31	9.21	-5.32	33.31	-9.21	0.000%
33	0.00	-33.31	10.56	0.00	33.31	-10.56	0.000%
34	-5.32	-33.31	9.21	5.32	33.31	-9.21	0.000%
35	-9.41	-33.31	5.43	9.41	33.31	-5.43	0.000%
36	-10.64	-33.31	0.00	10.64	33.31	-0.00	0.000%
37	-9.15	-33.31	-5.28	9.15	33.31	5.28	0.000%
38	-5.32	-33.31	-9.21	5.32	33.31	9.21	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.0000001	0.00046256
2	Yes	6	0.0000001	0.00020324
3	Yes	6	0.0000001	0.00020897
4	Yes	6	0.0000001	0.00021425
5	Yes	6	0.0000001	0.00020899
6	Yes	6	0.0000001	0.00020323
7	Yes	6	0.0000001	0.00020885
8	Yes	6	0.0000001	0.00021415
9	Yes	6	0.0000001	0.00020886
10	Yes	6	0.0000001	0.00020316
11	Yes	6	0.0000001	0.00020889
12	Yes	6	0.0000001	0.00021416
13	Yes	6	0.0000001	0.00020886
14	Yes	4	0.0000001	0.00066292
15	Yes	6	0.0000001	0.00020175
16	Yes	6	0.0000001	0.00020328
17	Yes	6	0.0000001	0.00020469
18	Yes	6	0.0000001	0.00020291
19	Yes	6	0.0000001	0.00020098
20	Yes	6	0.0000001	0.00020160
21	Yes	6	0.0000001	0.00020266
22	Yes	6	0.0000001	0.00020102
23	Yes	6	0.0000001	0.00019991
24	Yes	6	0.0000001	0.00020165
25	Yes	6	0.0000001	0.00020360
26	Yes	6	0.0000001	0.00020260
27	Yes	6	0.0000001	0.00020174
28	Yes	6	0.0000001	0.00020390
29	Yes	6	0.0000001	0.00020577
30	Yes	6	0.0000001	0.00020388
31	Yes	6	0.0000001	0.00020168
32	Yes	6	0.0000001	0.00020362
33	Yes	6	0.0000001	0.00020541
34	Yes	6	0.0000001	0.00020349
35	Yes	6	0.0000001	0.00020140
36	Yes	6	0.0000001	0.00020356
37	Yes	6	0.0000001	0.00020548
38	Yes	6	0.0000001	0.00020370

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Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	136 - 130	5.187	27	0.3024	0.0144
T2	130 - 110	4.772	27	0.3007	0.0131
T3	110 - 95	3.509	27	0.2760	0.0095
T4	95 - 90	2.664	27	0.2313	0.0073
T5	90 - 80	2.412	27	0.2091	0.0067
T6	80 - 60	1.823	27	0.1913	0.0055
T7	60 - 40	0.944	27	0.1329	0.0034
T8	40 - 20	0.397	27	0.0853	0.0020
T9	20 - 0	0.095	27	0.0366	0.0007

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
136'	(2) 980F90T2E-M w/ Mount Pipe	27	5.187	0.3024	0.0144	26238
127'	(4) DB844H90E-XY w/ Mount Pipe	27	4.572	0.2990	0.0125	22269
117'	RR90-17-02DP w/ Mount Pipe	27	3.934	0.2880	0.0107	37259
107'	(2) LPA-80063/4CF w/ Mount Pipe	27	3.330	0.2698	0.0091	32805
97'	7770.00 w/ Mount Pipe	27	2.767	0.2399	0.0076	13776
87'	800 10504 w/ Mount Pipe	27	2.242	0.2010	0.0063	10348
80'	GPS	27	1.823	0.1913	0.0055	9237
72'	GPS	27	1.413	0.1721	0.0046	9377

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	136 - 130	14.907	2	0.8685	0.0418
T2	130 - 110	13.717	2	0.8637	0.0379
T3	110 - 95	10.086	2	0.7932	0.0276
T4	95 - 90	7.658	2	0.6646	0.0213
T5	90 - 80	6.934	2	0.6006	0.0194
T6	80 - 60	5.242	2	0.5497	0.0158
T7	60 - 40	2.716	2	0.3819	0.0097
T8	40 - 20	1.141	2	0.2453	0.0056
T9	20 - 0	0.272	2	0.1053	0.0021

Critical Deflections and Radius of Curvature - Design Wind

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
136'	(2) 980F90T2E-M w/ Mount Pipe	2	14.907	0.8685	0.0418	9133
127'	(4) DB844H90E-XY w/ Mount Pipe	2	13.140	0.8588	0.0361	7754
117'	RR90-17-02DP w/ Mount Pipe	2	11.309	0.8276	0.0308	13004
107'	(2) LPA-80063/4CF w/ Mount Pipe	2	9.572	0.7753	0.0263	11445
97'	7770.00 w/ Mount Pipe	2	7.952	0.6892	0.0220	4789
87'	800 10504 w/ Mount Pipe	2	6.446	0.5773	0.0183	3609
80'	GPS	2	5.242	0.5497	0.0158	3198
72'	GPS	2	4.065	0.4945	0.0133	3251

Bolt Design Data

Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of Bolts	Maximum Load per Bolt	Allowable Load	Ratio Load Allowable	Allowable Ratio	Criteria
	ft			in		K	K			
T1	136	Leg	A325N	0.6250	5	0.78	12.89	0.061	1.333	Bolt DS
T2	130	Leg	A325N	0.7500	5	6.63	18.56	0.357	1.333	Bolt DS
T4	95	Leg	A325N	1.0000	6	12.89	34.51	0.373	1.333	Bolt Tension
T5	90	Leg	A325N	1.0000	6	13.38	34.55	0.387	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	5.76	8.43	0.684	1.333	Member Block Shear
T6	80	Leg	A325N	1.0000	6	19.09	34.56	0.553	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	5.56	7.75	0.717	1.333	Member Block Shear
T7	60	Leg	A325N	1.0000	6	23.52	34.56	0.681	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	5.00	8.43	0.593	1.333	Member Block Shear
T8	40	Leg	A325N	1.0000	6	27.41	34.56	0.793	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	5.01	8.43	0.594	1.333	Member Block Shear
T9	20	Leg	A687	1.2500	6	30.76	60.75	0.506	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	6.35	14.95	0.424	1.333	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P	Allow. P _a	Ratio P/P _a
	ft		ft	ft		ksi	in ²	K	K	
T1	136 - 130	1 1/2	6'	2'4-9/16"	76.0 K=1.00	19.800	1.7672	-3.92	34.99	0.112
T2	130 - 110	2	20'	2'4-9/16"	57.0	23.222	3.1416	-33.13	72.95	0.454

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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 $\frac{P}{P_a}$
T3	110 - 95	2 1/4	15'	2'4-11/16'	51.0 K=1.00	24.199	3.9761	-68.40	96.22	0.711
T4	95 - 90	2 1/4	5'	1'1-5/16"	23.7 K=1.00	27.898	3.9761	-85.74	110.92	0.773
T5	90 - 80	Pirod 105244 w/ 1 1/4" Reinforcement	10'1/4"	10'1/4"	36.1 K=1.00	26.370	5.8293	-88.98	153.72	0.579
T6	80 - 60	Pirod 105217	20'3/8"	10'1/4"	37.8 K=1.00	26.132	5.3014	-126.61	138.54	0.914
T7	60 - 40	Pirod 105218	20'3/8"	10'1/4"	32.4 K=1.00	26.848	7.2158	-156.90	193.73	0.810
T8	40 - 20	Pirod 105218	20'3/8"	10'1/4"	32.4 K=1.00	26.848	7.2158	-183.87	193.73	0.949
T9	20 - 0	Pirod 105219	20'3/8"	10'1/4"	28.4 K=1.00	27.351	9.4248	-208.39	257.78	0.808

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L _d ft	Kl/r	F _a ksi	A in ²	Actual V K	Allow. V _a K	Stress Ratio
T5	90 - 80	0.5	1'5-5/8"	140.9	7.527	0.1963	1.53	1.65	0.924
T6	80 - 60	0.5	1'5-5/8"	141.2	7.490	0.1963	1.16	1.65	0.708
T7	60 - 40	0.5	1'5-17/32"	140.0	7.617	0.1963	0.77	1.67	0.462
T8	40 - 20	0.5	1'5-17/32"	140.0	7.617	0.1963	0.71	1.67	0.423
T9	20 - 0	0.625	1'5-13/32"	111.1	11.525	0.3068	0.78	3.96	0.198

Diagonal Design Data (Compression)

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 $\frac{P}{P_a}$
T1	136 - 130	3/4	4'7-13/16'	2'3"	129.8 K=0.90	8.865	0.4418	-0.84	3.92	0.215
T2	130 - 110	7/8	5'23/32"	2'5-13/32'	121.0 K=0.90	10.197	0.6013	-3.25	6.13	0.530
T3	110 - 95	1	5'4-13/16'	2'7-5/16"	112.9 K=0.90	11.718	0.7854	-4.50	9.20	0.489
T4	95 - 90	1	5'5-5/32"	2'7-9/16"	113.5 K=0.90	11.602	0.7854	-5.35	9.11	0.587
T5	90 - 80	L3x3x3/16	9'10-11/16"	5'4-13/16'	108.6 K=1.00	11.691	1.0900	-6.23	12.74	0.489

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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 P P _a
T6	80 - 60	L2 1/2x2 1/2x3/16	10'3-23/32"	5'6-19/32"	134.6 K=1.00	8.246	0.9020	-6.23	7.44	0.837
T7	60 - 40	L3x3x3/16	11'11-3/4"	6'3-23/32"	127.0 K=1.00	9.262	1.0900	-5.35	10.10	0.530
T8	40 - 20	L3x3x3/16	13'4-3/16"	6'11-5/8"	140.3 K=1.00	7.587	1.0900	-5.45	8.27	0.659
T9	20 - 0	L3x3x5/16	14'8-5/32"	7'7-5/16"	155.0 K=1.00	6.212	1.7800	-7.14	11.06	0.645

Horizontal Design Data (Compression)

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 P P _a
T1	136 - 130	3/4	4'	3'10-9/16"	173.6 K=0.70	4.955	0.4418	-0.02	2.19	0.008
T2	130 - 110	7/8	4'4-9/16"	4'2-17/32"	161.6 K=0.70	5.715	0.6013	-0.34	3.44	0.099
T3	110 - 95	7/8	4'9-1/8"	4'6-27/32"	175.4 K=0.70	4.853	0.6013	-0.60	2.92	0.207
T4	95 - 90	7/8	4'10-9/16"	4'8-9/32"	180.0 K=0.70	4.609	0.6013	-0.80	2.77	0.288

Secondary Horizontal Design Data (Compression)

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 P P _a
T4	95 - 90	1 1/2	4'11-17/32"	4'9-1/4"	106.9 K=0.70	13.079	1.7672	-1.49	23.11	0.064

Top Girt Design Data (Compression)

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 P P _a
T1	136 - 130	7/8	4'	3'10-9/16"	148.8 K=0.70	6.744	0.6013	-0.36	4.06	0.090
T2	130 - 110	1	4'1/4"	3'10-3/16"	129.5 K=0.70	8.909	0.7854	-0.39	7.00	0.056
T3	110 - 95	1	4'6-1/4"	4'3-31/32"	145.5 K=0.70	7.058	0.7854	-0.96	5.54	0.174

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Bottom Girt Design Data (Compression)

Section No.	Elevation <i>ft</i>	Size	<i>L</i> <i>ft</i>	<i>L_n</i> <i>ft</i>	<i>Kl/r</i>	<i>F_a</i> <i>ksi</i>	<i>A</i> <i>in²</i>	Actual <i>P</i> <i>K</i>	Allow. <i>P_a</i> <i>K</i>	Ratio <i>P</i> <i>P_a</i>
T1	136 - 130	7/8	4'	3'10-9/16'	148.8 K=0.70	6.744	0.6013	-0.32	4.06	0.078
T2	130 - 110	1	4'5-7/8"	4'3-31/32'	145.4 K=0.70	7.061	0.7854	-1.43	5.55	0.258
T4	95 - 90	1	4'11-7/8"	4'9-19/32'	161.2 K=0.70	5.746	0.7854	-1.63	4.51	0.361

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation <i>ft</i>	Size	<i>L</i> <i>ft</i>	<i>L_n</i> <i>ft</i>	<i>Kl/r</i>	<i>F_a</i> <i>ksi</i>	<i>A</i> <i>in²</i>	Actual <i>P</i> <i>K</i>	Allow. <i>P_a</i> <i>K</i>	Ratio <i>P</i> <i>P_a</i>
T1	136 - 130	1 1/2	6'	2'4-9/16"	76.0	32.500	0.7732	2.32	25.13	0.092
T2	130 - 110	2	20'	2'4-9/16"	57.0	32.500	1.5625	28.43	50.78	0.560
T3	110 - 95	2 1/4	15'	2'4-11/16'	51.0	30.000	3.9761	60.84	119.28	0.510
T4	95 - 90	2 1/4	5'	1'1-5/16"	23.7	30.000	3.9761	77.32	119.28	0.648
T5	90 - 80	Pirod 105244 w/ 1 1/4" Reinforcement	10'1/4"	10'1/4"	36.1	30.000	5.8293	80.29	174.88	0.459
T6	80 - 60	Pirod 105217	20'3/8"	10'1/4"	37.8	30.000	5.3014	114.56	159.04	0.720
T7	60 - 40	Pirod 105218	20'3/8"	10'1/4"	32.4	30.000	7.2158	141.13	216.47	0.652
T8	40 - 20	Pirod 105218	20'3/8"	10'1/4"	32.4	30.000	7.2158	164.48	216.47	0.760
T9	20 - 0	Pirod 105219	20'3/8"	10'1/4"	28.4	30.000	9.4248	184.59	282.74	0.653

Truss-Leg Diagonal Data

Section No.	Elevation <i>ft</i>	Diagonal Size	<i>L_d</i> <i>ft</i>	<i>Kl/r</i>	<i>F_a</i> <i>ksi</i>	<i>A</i> <i>in²</i>	Actual <i>V</i> <i>K</i>	Allow. <i>V_a</i> <i>K</i>	Stress Ratio
T5	90 - 80	0.5	1'5-5/8"	140.9	7.527	0.1963	1.53	1.65	0.924
T6	80 - 60	0.5	1'5-5/8"	141.2	7.490	0.1963	1.16	1.65	0.708

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Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in ²	Actual V K	Allow. V_a K	Stress Ratio
T7	60 - 40	0.5	1'5-17/3 2"	140.0	7.617	0.1963	0.77	1.67	0.462
T8	40 - 20	0.5	1'5-17/3 2"	140.0	7.617	0.1963	0.71	1.67	0.423
T9	20 - 0	0.625	1'5-13/3 2"	111.1	11.525	0.3068	0.78	3.96	0.198

Diagonal Design Data (Tension)

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 $\frac{P}{P_a}$
T1	136 - 130	3/4	4'7-13/16'	2'3"	144.2	30.000	0.4418	0.83	13.25	0.063
T2	130 - 110	7/8	5'23/32"	2'5-13/32'	134.5	30.000	0.6013	3.25	18.04	0.180
T3	110 - 95	1	5'4-13/16'	2'7-5/16"	125.4	30.000	0.7854	4.46	23.56	0.189
T4	95 - 90	1	5'5-5/32"	2'7-9/16"	126.1	30.000	0.7854	5.25	23.56	0.223
T5	90 - 80	L3x3x3/16	9'10-11/16' 6"	5'4-13/16'	69.0	29.000	0.6593	5.76	19.12	0.301
T6	80 - 60	L2 1/2x2 1/2x3/16	10'3-23/32' 2"	5'6-19/32'	85.6	29.000	0.5183	5.56	15.03	0.370
T7	60 - 40	L3x3x3/16	11'4-5/16'	6'1/4"	76.9	29.000	0.6593	5.00	19.12	0.262
T8	40 - 20	L3x3x3/16	13'4-3/16'	6'11-5/8"	89.0	29.000	0.6593	5.01	19.12	0.262
T9	20 - 0	L3x3x5/16	14'8-5/32'	7'7-5/16"	99.0	29.000	1.0127	6.35	29.37	0.216

Horizontal Design Data (Tension)

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 $\frac{P}{P_a}$
T1	136 - 130	3/4	4'	3'10-9/16'	248.0	30.000	0.4418	0.11	13.25	0.008
T2	130 - 110	7/8	4'4-9/16"	4'2-17/32'	230.9	30.000	0.6013	0.47	18.04	0.026
T3	110 - 95	7/8	4'9-1/8"	4'6-27/32'	250.6	30.000	0.6013	0.76	18.04	0.042
T4	95 - 90	7/8	4'10-9/16'	4'8-9/32"	257.1	30.000	0.6013	0.94	18.04	0.052

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Secondary Horizontal Design Data (Tension)

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 $\frac{P}{P_a}$
T4	95 - 90	1 1/2	4'11-17/32"	4'9-1/4"	152.6	30.000	1.7672	1.49	53.01	0.028 ✓

Top Girt Design Data (Tension)

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 $\frac{P}{P_a}$
T1	136 - 130	7/8	4'	3'10-9/16'	212.6	30.000	0.6013	0.35	18.04	0.020 ✓
T2	130 - 110	1	4'1/4"	3'10-3/16'	184.9	30.000	0.7854	0.42	23.56	0.018 ✓
T3	110 - 95	1	4'6-1/4"	4'3-31/32'	207.8	30.000	0.7854	1.02	23.56	0.043 ✓

Bottom Girt Design Data (Tension)

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 $\frac{P}{P_a}$
T1	136 - 130	7/8	4'	3'10-9/16'	212.6	30.000	0.6013	0.35	18.04	0.020 ✓
T2	130 - 110	1	4'5-7/8"	4'3-31/32'	207.8	30.000	0.7854	1.43	23.56	0.061 ✓
T4	95 - 90	1	4'11-7/8"	4'9-19/32'	230.3	30.000	0.7854	1.60	23.56	0.068 ✓

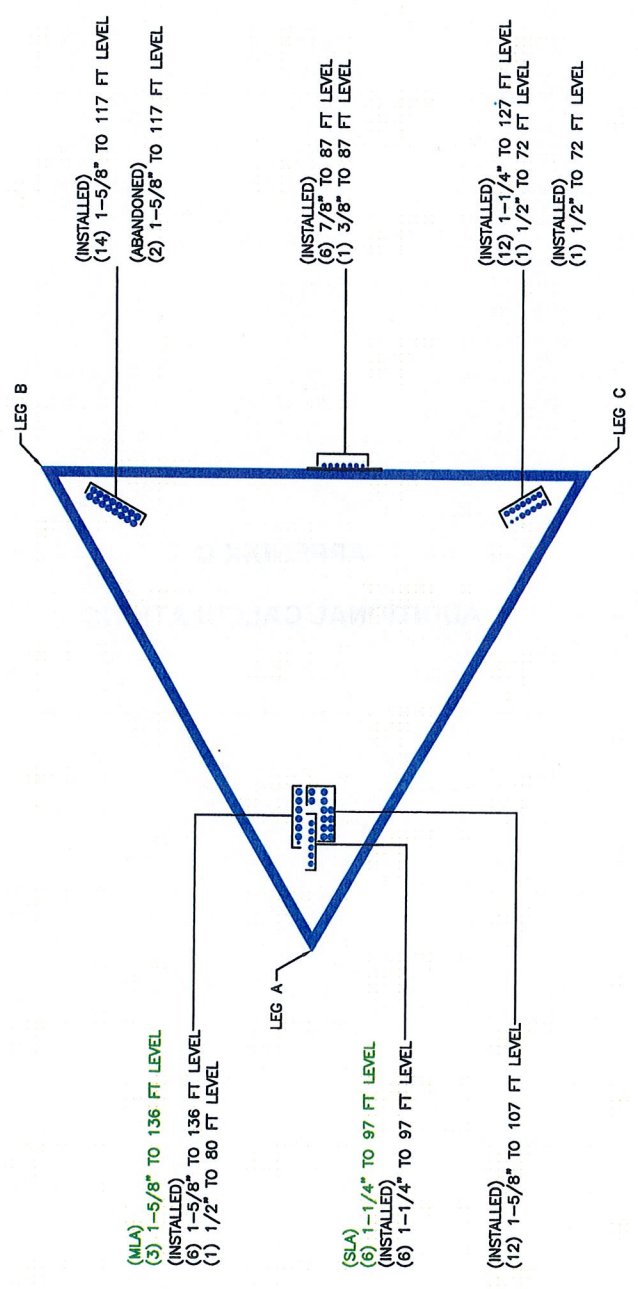
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
T1	136 - 130	Leg	1 1/2	3	-3.92	46.64	8.4	Pass
T2	130 - 110	Leg	2	23	28.43	67.69	42.0	Pass
T3	110 - 95	Leg	2 1/4	89	-68.40	128.26	53.3	Pass
T4	95 - 90	Leg	2 1/4	136	-85.74	147.86	58.0	Pass
T5	90 - 80	Leg	Pirol 105244 w/ 1 1/4"	166	-88.98	204.90	69.3	Pass
			Reinforcement					
T6	80 - 60	Leg	Pirol 105217	175	-126.61	184.67	68.6	Pass
T7	60 - 40	Leg	Pirol 105218	190	-156.90	258.24	60.8	Pass
T8	40 - 20	Leg	Pirol 105218	205	-183.87	258.24	71.2	Pass
T9	20 - 0	Leg	Pirol 105219	220	-208.39	343.62	60.6	Pass
T1	136 - 130	Diagonal	3/4	18	-0.84	5.22	16.1	Pass
T2	130 - 110	Diagonal	7/8	36	-3.25	8.17	39.8	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail	
T3	110 - 95	Diagonal	1	95	-4.50	12.27	36.7	Pass	
T4	95 - 90	Diagonal	1	145	-5.35	12.15	44.0	Pass	
T5	90 - 80	Diagonal	L3x3x3/16	169	-6.23	16.99	36.7	Pass	
							51.3 (b)		
T6	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	184	-6.23	9.92	62.8	Pass	
T7	60 - 40	Diagonal	L3x3x3/16	193	-5.35	13.46	39.7	Pass	
							44.5 (b)		
T8	40 - 20	Diagonal	L3x3x3/16	208	-5.45	11.02	49.4	Pass	
T9	20 - 0	Diagonal	L3x3x5/16	223	-7.14	14.74	48.4	Pass	
T1	136 - 130	Horizontal	3/4	16	-0.02	2.92	0.6	Pass	
T2	130 - 110	Horizontal	7/8	45	-0.34	4.58	7.4	Pass	
T3	110 - 95	Horizontal	7/8	106	-0.60	3.89	15.5	Pass	
T4	95 - 90	Horizontal	7/8	137	-0.80	3.69	21.6	Pass	
T4	95 - 90	Secondary Horizontal	1 1/2	154	-1.49	30.81	4.8	Pass	
T1	136 - 130	Top Girt	7/8	5	-0.36	5.41	6.7	Pass	
T2	130 - 110	Top Girt	1	26	-0.39	9.33	4.2	Pass	
T3	110 - 95	Top Girt	1	92	-0.96	7.39	13.0	Pass	
T1	136 - 130	Bottom Girt	7/8	7	-0.32	5.41	5.9	Pass	
T2	130 - 110	Bottom Girt	1	31	-1.43	7.39	19.4	Pass	
T4	95 - 90	Bottom Girt	1	140	-1.63	6.02	27.1	Pass	
							Summary		
							Leg (T8)	71.2	Pass
							Diagonal (T6)	62.8	Pass
							Horizontal (T4)	21.6	Pass
							Secondary Horizontal (T4)	4.8	Pass
							Top Girt (T3)	13.0	Pass
							Bottom Girt (T4)	27.1	Pass
							Bolt Checks	59.5	Pass
							RATING =	71.2	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Maximum Allowable Moment of a Circular Pier

Axial Load (Negative for Compression) = 191.00 kips

Pier Properties		Material Properties	
Concrete:		Concrete compressive strength =	3000 psi
Pier Diameter =	3.0 ft	Reinforcement yield strength =	60000 psi
Concrete Area =	1017.9 in ²	Modulus of elasticity =	29000 ksi
Reinforcement:		Reinforcement yield strain =	0.00207
Clear Cover =	3.00 in	Limiting compressive strain =	0.003
Cage Diameter =	2.42 ft	Seismic Properties	
Bar Size =	8	Seismic Zone =	1
Bar Diameter =	1.00 in		
Bar Area =	0.79 in ²		
Number of Bars =	15		

Minimum Area of Steel

Required area of steel = 5.09 in²

Provided area of steel = 11.85 in²

OK

Axial Loading

Load factor = 1.3

Reduction factor = 0.9

Factored axial load = 275.8889 kips

Neutral Axis

Distance from extreme edge to neutral axis = 5.79 in

Equivalent compression zone factor = 0.85

Distance from extreme edge to equivalent compression zone factor = 4.92 in

Distance from centroid to neutral axis = 12.21 in

Compression Zone

Area of steel in compression zone = 1.58 in²

Angle from centroid of pier to intersection of equivalent compression zone and edge of pier = 43.41 deg

Area of concrete in compression = 83.75 in²

Force in concrete = $0.85 * f_c * Acc$ = 213.57 kips

Total reinforcement forces = -489.46 kips

Factored axial load = 275.89 kips

Force in concrete = -213.57 kips

Sum of the forces in concrete = 0.00 kips

OK

Maximum Moment

First moment of the concrete

area in compression about the centroid = 1262.17 in³

Distance between centroid of concrete

in compression and centroid of pier = 15.07 in

Moment of concrete in compression = 3218.54 in-kips

Total reinforcement moment = 2925.43 in-kips

Nominal moment strength of column = 6143.96 in-kips

Factored moment strength of column = 4253.51 in-kips

Maximum Allowable Moment = 354.46 ft-kips

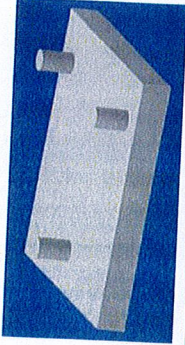
Individual Bars

Bar #	Angle from first bar (deg)	Distance to centroid (in)	Distance to neutral axis (in)	Distance to equivalent comp. zone (in)	Strain	Area of steel in compression (in ²)	Stress (ksi)	Axial force (kips)
1	0.00	0.00	-12.21	-13.08	-0.0063201	0.00	-60.00	-47.40
2	24.00	5.90	-6.31	-7.18	-0.0032664	0.00	-60.00	-47.40
3	48.00	10.78	-1.43	-2.30	-0.0007407	0.00	-21.48	-16.97
4	72.00	13.79	1.58	0.72	0.0008203	0.79	23.79	16.78
5	96.00	14.42	2.21	1.35	0.0011466	0.79	33.25	24.25
6	120.00	12.56	0.35	-0.52	0.0001819	0.00	5.28	4.17
7	144.00	8.52	-3.68	-4.55	-0.0019071	0.00	-55.31	-43.69
8	168.00	3.01	-9.19	-10.06	-0.0047591	0.00	-60.00	-47.40
9	192.00	-3.01	-15.22	-16.09	-0.007881	0.00	-60.00	-47.40
10	216.00	-8.52	-20.73	-21.60	-0.0107331	0.00	-60.00	-47.40
11	240.00	-12.56	-24.76	-25.63	-0.0128221	0.00	-60.00	-47.40
12	264.00	-14.42	-26.63	-27.50	-0.0137868	0.00	-60.00	-47.40
13	288.00	-13.79	-26.00	-26.87	-0.0134605	0.00	-60.00	-47.40
14	312.00	-10.78	-22.98	-23.85	-0.0118995	0.00	-60.00	-47.40
15	336.00	-5.90	-18.10	-18.97	-0.0093738	0.00	-60.00	-47.40

Unit Base Foundation

Checks capacity of square mat foundation with raised piers for a self-supporting tower

BU#: 876338
 Site Name: WATERFORD
 App Number: 114805



Design Reactors	
Shear, S:	31.00 kips
Moment, M:	2495.00 ft-kips
Compression/leg, Cc:	217.00 kips
Uplift/leg, Ua:	191.00 kips
Tower Weight, Wt:	33.00 kips
Tower Height, H:	136 ft
Base Face Width, w:	14 ft

Pad Properties	
Depth, D:	6.0 ft
Pad Width, W:	23.0 ft
Pad Thickness, T:	3.3 ft
Ext. Above Grade, E:	0.5 ft
Neglected Depth, N:	2.0 ft
Pad Rebar Size, Sp:	9
Pad Rebar Quantity, mp:	46

Pier Properties	
Pier Shape:	Circular
Pier Diameter, di:	3.0 ft
Pier Rebar Size, S:	8
Pier Rebar Quantity, mc:	15
Pier Tie Size, St:	4
Tie Quantity, mt:	7

Material Properties	
Rebar Tensile, Fy:	60000 psi
Concrete Strength, Fc:	3000 psi
Concrete Density, δc:	150 pcf
Clear Cover, cc:	3 in

Soil Properties	
Soil Unit Weight, γ:	120 pcf
Allowable Net Bearing, Bc:	4.000 ksf
Cohesion, Co:	0.000 ksf
Friction Angle, φ:	36 degrees
Seismic Zone, Sz:	1
Base Sliding, μ:	0.3

Design Checks			
	Capacity/Availability	Demand/Limits	Check
Base Sliding (kips):	134.27	31.00	OK
Overturning (ft-kips):	4251.77	2696.50	OK
Bearing (ksf):	4.00	1.64	OK
1-way Shear (kips):	1071.38	38.59	OK
2-way Shear (kips):	1742.34	376.13	OK
Pier concrete stress (ksf):	1587.89	282.10	OK
Pier rebar area (in ²):	11.85	5.09	OK
Pier moment capacity (k-ft):	354.46	50.38	OK
Vertical rebar spacing (in):	5.07	18 > s > 2	OK
Vertical rebar dev. (in pier) (in):	36.00	18.35	OK
Vertical rebar dev. (in pad) (in):	36.00	18.35	OK
Vertical rebar hook length (in):	36.00	16.00	OK
Tie spacing (in pier) (in):	7.80	16 > s > 4.5	OK
Pad rebar area (in ²):	46.00	9.89	OK
Pad rebar spacing (in):	5.87	15 > s > 5	OK
Pad rebar development, (in):	51.00	12.00	OK

✓ Tower centroid is offset from foundation centroid

Modification Checks			
	Capacity/Availability	Demand/Limits	Check
Sleeve rebar area (in ²):	20	0	Not Used
Sleeve moment capacity (k-ft):	354.46	50.375	Not Used
Sleeve rebar spacing (in):	N/A	18 > s > 2	Not Used
Sleeve tie spacing (in):	N/A	18 > s > 4.5	Not Used
Minimum extra thickness (in):	0.0	0	Not Used
Pad rebar area - short (in ²):	50.00	0.00	Not Used
Pad rebar area - long (in ²):	50.00	0.00	Not Used
Pad rebar spacing - short (in):	4.4	18 > s > 2	Not Used
Pad rebar spacing - long (in):	4.4	18 > s > 2	Not Used
End cap width, (ft):	0	0.00	Not Used
Rebar area, (in ²):	3.41	0.00	Not Used
Rebar spacing, (in):	-1.3	18 > s > 2	Not Used
Tie spacing, (in):	4.1	270 > s > 4.5	Not Used
Dowel steel, (in ²):	13.20	0.00	Not Used
Dowel embedment, (in):	6.0	6.0	Not Used
Dowel edge dist., (in):	12.0	8.6	Not Used
Dowel spacing, (in):	6.7	12.0	Not Used
Dowel edge dist. (vert), (in):	13.5	8.6	Not Used
Dowel development length (in):	3.0	15.4	Not Used

Modifications			
	Capacity/Availability	Demand/Limits	Check
Pier Sleeve, ds:	0	in	
Revised Pier Diameter, drc:	3.00	ft	0.0
PS Rebar Size, Ss:	9	equally spaced	23
Rebar Quantity, ms:	20		5
Tie Size, Sst:	3		11
Tie Quantity, mst:	6		4
Pad Thickness, Te:	0	in	per side
Revised Pad Thickness, Tc:	3.25	ft	60
Rebar Size, Se:	9		6
Rebar Quantity (short), me:	50		30
Rebar Quantity (long), mex:	50		1
Dowel Size, Sed:	3		6.00
Dowel Quantity, med:	3		12.00