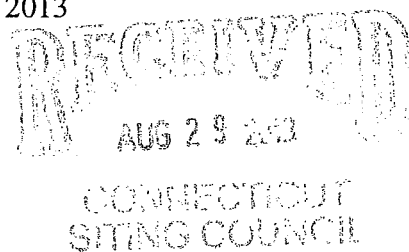


280 Trumbull Street  
Hartford, CT 06103-3597  
Main (860) 275-8200  
Fax (860) 275-8299  
kbaldwin@rc.com  
Direct (860) 275-8345

Also admitted in Massachusetts

August 28, 2013



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

Re: **EM-VER-100-120416 – 38 Lower Road, North Canaan, Connecticut**  
**EM-VER-051-121114 – 3965 Congress Street, Fairfield, Connecticut**  
**EM-VER-135-130603 – 1590 Newfield Avenue, Stamford, Connecticut**  
**EM-VER-014-130607 – 180 North Main Street, Branford, Connecticut**  
**EM-VER-033-130618 – 179 Shunpike Road, Cromwell, Connecticut**  
**EM-VER-041-130524 – 135 Honey Hill Road, East Haddam, Connecticut**  
**EM-VER-027-130603 – 48 Cow Hill Road, Clinton, Connecticut**  
**EM-VER-076-130425 – 252 Ridge Road, Madison, Connecticut**

**Completion of Construction Activity**

Dear Ms. Bachman:

The purpose of this letter is to notify the Siting Council that construction activity associated with the above-referenced Cellco Partnership d/b/a Verizon Wireless telecommunications facilities has been completed.

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

Sincerely,

A handwritten signature in black ink, appearing to read "K Baldwin". Below the signature, the name "Kenneth C. Baldwin" is printed in a standard font.

Copy to:  
Sandy M. Carter



*Law Offices*

BOSTON

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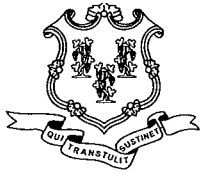
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12413244-v1



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](mailto:siting.council@ct.gov)

[www.ct.gov/csc](http://www.ct.gov/csc)

July 12, 2013

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

RE: **EM-VER -033-130618** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 179 Shunpike Road, Cromwell, Connecticut.

Dear Attorney Baldwin:

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

- Any deviation from the proposed modification as specified in this notice and supporting materials with the Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated June 17, 2013. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Very truly yours,

Melanie A. Bachman  
Acting Executive Director

MAB/CDM/jb

c: The Honorable Mertie Terry, First Selectman, Town of Cromwell  
Frederic Curtin, Zoning Enforcement Officer, Town of Cromwell  
Cromwell Fire District

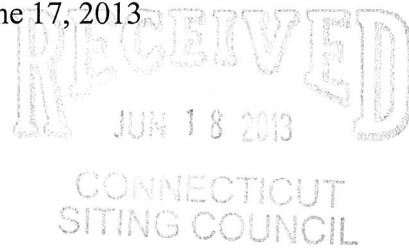




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Also admitted in Massachusetts

June 17, 2013



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

Re: **Notice of Exempt Modification – Facility Modification  
179 Shunpike Road, Cromwell, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) antennas at the 101-foot level of the existing 170-foot tower at 179 Shunpike Road in Cromwell. The tower and underlying property are owned by the Cromwell Fire District. The Council approved Cellco’s shared use of this tower in 2007. Cellco now intends to replace one (1) of its existing antennas with one (1) model BXA-70063-6CF LTE antenna at the same height on the tower. Attached behind Tab 1 are the specifications for the replacement antenna.

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 Mertie Terry, Cromwell’s First Selectman.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco’s replacement antennas will be located at the 101-foot level of the existing 170-foot tower.

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



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# ROBINSON & COLE LLP

Melanie A. Bachman  
June 17, 2013  
Page 2

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antenna will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Tab 2.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support Cellco's proposed antenna modification. (*See Detailed Structural Analysis and Evaluation attached behind Tab 3*).

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

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Mertie Terry, Cromwell First Selectman  
Cromwell Fire District  
Sandy M. Carter





## BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

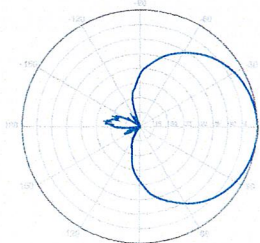
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics	696-900 MHz		
Frequency bands	696-806 MHz	806-900 MHz	
Polarization	±45°		
Horizontal beamwidth	65°	63°	
Vertical beamwidth	13°	11°	
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10		
Impedance	50Ω		
VSWR	≤1.35:1		
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB	
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB	
Null fill	5% (-26.02 dB)		
Isolation between ports	< -25 dB		
Input power with EDIN connectors	500 W		
Input power with NE connectors	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in	
Depth with z-brackets	172 mm	6.8 in	
Weight without mounting brackets	7.9 kg	17 lbs	
Survival wind speed	> 201 km/hr	> 125 mph	
Wind area	Front: 0.51 m <sup>2</sup> Side: 0.24 m <sup>2</sup>	Front: 5.5 ft <sup>2</sup> Side: 2.6 ft <sup>2</sup>	
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf	
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

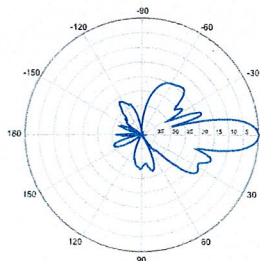


BXA-70063-6CF-EDIN-X



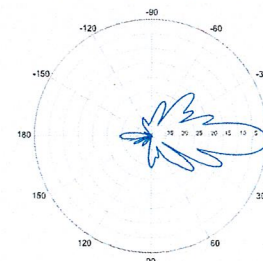
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

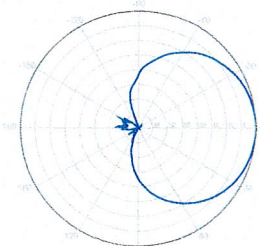


0° | Vertical | 750 MHz

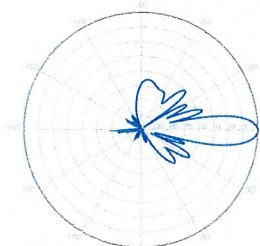
BXA-70063-6CF-EDIN-2



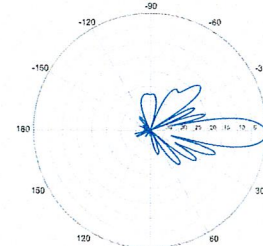
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

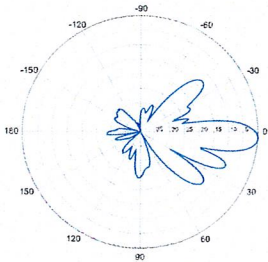
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product.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



**BXA-70063-6CF-EDIN-X**

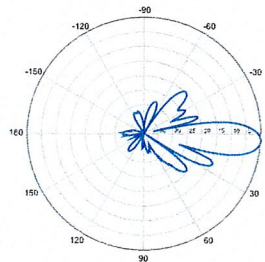
X-Pol | FET Panel | 63° | 14.5 dBd

**BXA-70063-6CF-EDIN-3**



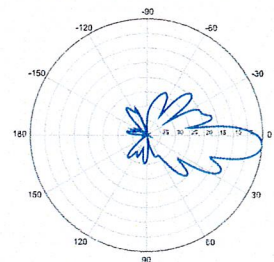
3° | Vertical | 750 MHz

**BXA-70063-6CF-EDIN-4**

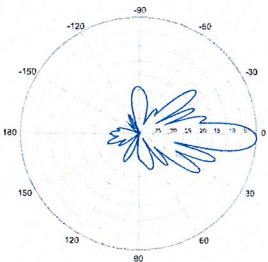


4° | Vertical | 750 MHz

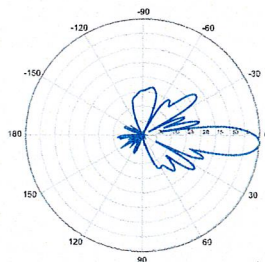
**BXA-70063-6CF-EDIN-5**



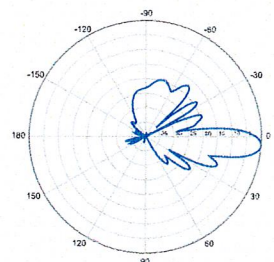
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

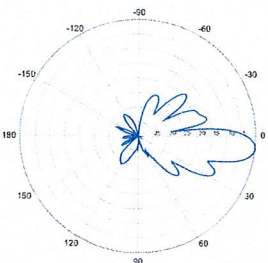


4° | Vertical | 850 MHz



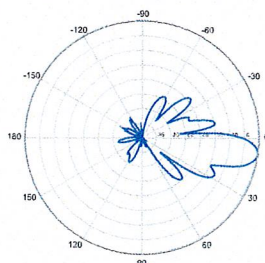
5° | Vertical | 850 MHz

**BXA-70063-6CF-EDIN-6**



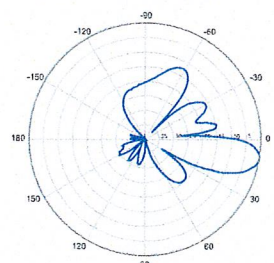
6° | Vertical | 750 MHz

**BXA-70063-6CF-EDIN-8**

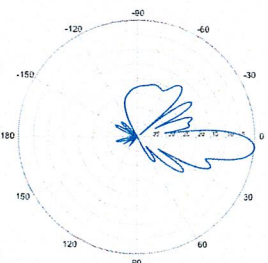


8° | Vertical | 750 MHz

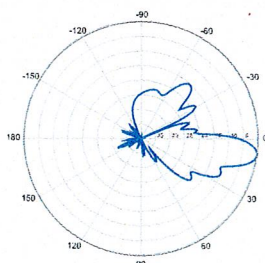
**BXA-70063-6CF-EDIN-10**



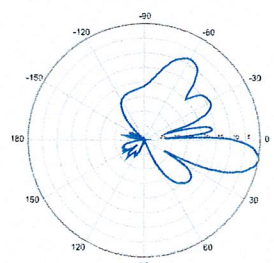
10° | Vertical | 750 MHz



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.

Site Name: Cromwell N Tower Height: Verizon @ 101ft		General		Power		Density							
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total					
*AT&T UMTS	2	565	115	0.0307	880	0.5867	5.24%						
*AT&T UMTS	2	875	115	0.0476	1900	1.0000	4.76%						
*AT&T GSM	1	283	115	0.0077	880	0.5867	1.31%						
*AT&T GSM	4	525	115	0.0571	1900	1.0000	5.71%						
*AT&T LTE	1	1313	115	0.0357	734	0.4893	7.30%						
*MetroPCS CDMA	3	727	160	0.0306	2135	1.0000	3.06%						
*MetroPCS LTE	1	1200	160	0.0169	2130	1.0000	1.69%						
*T-Mobile GSM	8	131	125	0.0241	1945	1.0000	2.41%						
*T-Mobile UMTS	2	740	125	0.0341	2100	1.0000	3.41%						
*CR Police Dept	1	635	159	0.0090	635	0.4233	2.13%						
*CR Fire Dept	1	100	128	0.0022	46	0.2000	1.10%						
*CR Fire Dept	1	110	135	0.0022	154	0.2000	1.09%						
*CR Fire Alarm	1	500	127	0.0111	460	0.3067	3.63%						
*Clearwire	2	153	134	0.0061	2496	1.0000	0.61%						
*Clearwire	1	211	134	0.0042	11 GHz	1.0000	0.42%						
*Sprint	11	359	170	0.0491	1962.5	1.0000	4.91%						
Verizon PCS	11	274	101	0.1062	1970	1.0000	10.62%						
Verizon Cellular	9	273	101	0.0866	869	0.5793	14.95%						
Verizon AWS	1	1750	101	0.0617	2145	1.0000	6.17%						
Verizon 700	1	886	101	0.0312	698	0.4653	6.71%						
								87.23%					
* Source: Siting Council													

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**DETAILED STRUCTURAL ANALYSIS AND  
EVALUATION OF AN EXISTING 170' SELF  
SUPPORTING LATTICE TOWER AND  
FOUNDATION FOR PROPOSED ANTENNA  
ARRANGEMENT**

**Site Name: Cromwell N CT  
Address: 179 Shunpike Road  
Cromwell, CT**

---

*prepared for*



**Verizon Wireless  
99 East River Drive  
East Hartford, Connecticut 06108**

*prepared by*



**URS CORPORATION  
500 ENTERPRISE DRIVE, SUITE 3B  
ROCKY HILL, CT 06067  
TEL. 860-529-8882**

36922291.00000  
VZ5-133 (Rev 2)

May 20, 2013

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- 1. EXECUTIVE SUMMARY**
- 2. INTRODUCTION**
- 3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS**
- 4. FINDINGS AND EVALUATION**
- 5. CONCLUSIONS AND RECOMMENDATIONS**
- 6. DRAWINGS AND DATA**
  - **TNX TOWER INPUT / OUTPUT SUMMARY**
  - **TNX TOWER FEEDLINE DISTRIBUTION**
  - **TNX TOWER FEEDLINE PLAN**
  - **TNX TOWER DETAILED OUTPUT**
  - **ANCHOR BOLT ANALYSIS**
  - **FOUNDATION ANALYSIS**

**1. EXECUTIVE SUMMARY**

This report summarizes the structural analysis of the existing 170' self supporting lattice tower located at 179 Shunpike Road in Cromwell, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code which requires a three second gust wind speed of 100 mph which converts to an 80 mph fastest mile per 2003 IBC (Table 1609.3.1) and the TIA/EIA-222-F standard for a wind velocity of 85 mph (fastest mile). The wind speed from the Connecticut State Building Code governs the design at 85 mph (fastest mile) and 74 mph (fastest mile) concurrent with ½ " ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report.

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
<b><u>Remove:</u></b> (1) Swedcom SWCP 2x5514 Antenna (Beta Sector)	Verizon (Existing)	@ 101'
<b><u>Install:</u></b> (1) Amphenol BXA-70063-6CF Panel Antenna (Beta Sector)	Verizon (Proposed)	@ 101'

The results of the analysis indicate that the tower and foundation have the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.**

This analysis is based on:

- 1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
- 2) Tower geometry, structural member sizes, and Foundation information taken from a tower report prepared by PiROD Inc., ENG. File No. A-116398, dated November 18, 1999.
- 3) Structural analysis performed by URS Corp., project number VZ5-133 / 36922291.00000 signed and sealed on November 21, 2012.
- 4) Structural analysis performed by URS Corp, project number CFD-003 / 36924489 signed and sealed May 29, 2012.
- 5) Existing inventory taken from a tower mapping and inventory prepared by Northeast Towers, Inc performed on February 9, 2012.
- 6) Structural analysis performed by URS Corp, project number MXN-004 / 36924397 signed and sealed August 16, 2010.
- 7) Foundation modification drawings prepared by Teconic, dated May 5, 2004.
- 8) Proposed additional antenna and mount configuration as specified in Section 2 of this report.



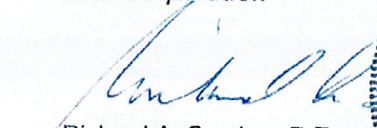
**URS** EXECUTIVE SUMMARY (continued)

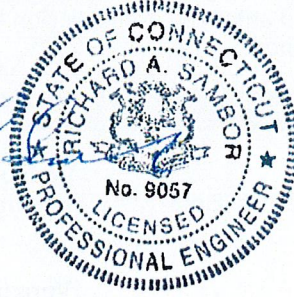
This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the assumption of the antenna and mount configuration as well as the physical condition of the tower and connections. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please call.

Sincerely,

*URS Corporation*

  
Richard A. Sambor, P.E.  
Senior Structural Engineer



RAS/mcd

## 2. INTRODUCTION

The subject tower is located at 179 Shunpike Road in Cromwell, Connecticut. The structure is a 170' self supporting lattice tower designed and manufactured by PiROD Inc.

The current inventory with proposed modification is summarized in the table below:

<b>Antenna Type</b>	<b>Carrier</b>	<b>Mount</b>	<b>Antenna Centerline Elevation</b>	<b>Cable</b>
(1) Tx Rx 101-90-08 antenna	Town (existing)	15' Mast pipe on 9 Arm Halo Mount	183'	(1) 7/8"
(1) 8 Bay Dipole (3" dia x 20')	Town (existing)	9 Arm Halo Mount	178'	(1) 7/8"
(1) 2 1/2" dia x 20' Whip	Town (existing)	9 Arm Halo Mount	178'	(1) 1 1/2"
(3) 2 1/2" dia x 15' Whip	Town (existing)	9 Arm Halo Mount	175'	(3) 7/8"
1 1/2" dia x 12' Whip	Town (existing)	9 Arm Halo Mount	174'	(1) 7/8"
(1) Radiowaves HPD2-4.7 w/ Radome (1) Cambium PTP49600 Antenna	CPD (existing)	Leg Mounted	168'	(1) WB3176A – Copper Clad Outdoor Cable (2) 4' long 1/2" Jumper Cables
(1) SU-RA-HP-2.4 (1' x 1' Antenna)	Town (existing)	9 Arm Halo Mount	168'	(1) 3/8"
(6) Decibel 950G65VTZEM antennas	Sprint (existing)	9 Arm Halo Mount	168'	(6) 1 5/8"
(3) APXV18-206517S	Unknown (existing)	Leg Mount	159'-6"	(6) 1 5/8"
(1) Sinclair SC420-HF1LDF Omni	CPD (existing)	Pipe mount	158'-6"	(1) 1 5/8" Low Density Foam Cable
(2) 3" dia x 20' Whip	Town (existing)	20' Platform	144'	(2) 7/8"
(1) 2 1/2" x 20' Whip	Town (existing)	20' Platform	144'	(1) 1/2"
2" dia x 15' Whip	Town (existing)	20' Platform	141'	(1) 1/2"
(1) 1.5" dia x 10' Whip	Town (existing)	20' Platform	139'	(1) 1/2"
(1) 3.5" dia x 9' Whip	Town (existing)	20' Platform	138'-6"	---
(3) Argus LLPX310R antennas (3) Samsung Remote Radio Heads U-RAS	Clearwire (existing)	20' Platform	134'	(6) CAT 5 cable
(3) Andrew VHLP2.5 dish (2.5' dia.) (1) Andrew VHLP2 dish (2' dia.): Gamma Sector		20' Platform	134'	(4) 1/2"
(3) RFS APX16DWV-16DWVS-A20 antennas w/ (3) Twin AWS TMAs. (3) RFS APX16DWV-16DWV-S w/ (3) Twin PCS TMAs.	T-Mobile (existing)	(3) Existing T-Frames	125'	(18) 1 5/8"
(6) Powerwave 7770 (12) TMA's	AT&T (existing)	(3) T-Frames	115'	(12) 1 5/8"
(3) KMW AM-X-CD-16-65-00T-RET (6) RRU (1) Surge Suppressor	AT&T (existing)	Shared with Above	115'	(3) Optic Fiber & (6) DC Cables (Located within 3" dia Flex Conduit)

<b>Antenna Type</b>	<b>Carrier</b>	<b>Mount</b>	<b>Antenna Centerline Elevation</b>	<b>Cable</b>
(2) SWCP 2x5514 antennas, <b>(1) BXA-70063-6CF-2 antenna (Beta Sector)</b> (6) SC-E 6014 Rev 2 antennas, (3) BXA-171063-12BF 2 antennas, (6) FD9R6004/2C-3L Diplexers	Verizon (existing)	(3) T-Frames (PiROD part #800093)	101'	(12) 1 5/8"
(1) 3" x 2" x 22" Panel (1) TMA	AT&T (existing)	Pipe Mount	87'	(2) CAT 5
(1) 3' Dish (1) TMA	AT&T (existing)	3' Stand-off	83'	(2) CAT 5
(1) 3" x 2" x 22" Panel (1) TMA	AT&T (existing)	3' Stand-off	80'	(2) CAT 5
(1) Camera	Unknown (existing)	Leg Mounted	30'	(2) 1/2" (estimated from photographs)
(1) 3' Yagi	Unknown (existing)	Leg Mounted	24'	(1) 1/2"

This structural analysis of the communications tower was performed by URS Corporation (URS) for the Cromwell Fire District. The purpose of this analysis was to investigate the structural integrity of the existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

### 3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with the Connecticut State Building Code, TIA/EIA-222-F - Structural Standard for Steel Antenna Towers and Antenna Supporting Structures, and the American Institute of Steel Construction (AISC) Manual of Steel Construction – Allowable Stress Design (ASD).

The analysis was conducted using TNX Tower 6.0. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

#### Basic Wind Speed:

- Middlesex County;  $v = 85$  mph (fastest mile) [Section 16 of TIA/EIA-222-F-1996]
- Cromwell;  $v = 100$  mph (3 second gust) equivalent to 80 mph (fastest mile) [Appendix K, 2005 Connecticut State Building Code Supplement]

#### Loading Cases:

Load Condition 1 = 85 mph (fastest mile) Wind Load (without ice) + Tower Dead Load

Load Condition 2 = 74 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25 percent reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

#### 4. FINDINGS AND EVALUATION

Stresses on the tower structure and previously modified foundation were evaluated to compare with allowable stresses in accordance with AISC. The results of the analysis indicate that the calculated stresses on the structure with the proposed loading are within the allowable stresses. Additionally, the anchor bolts were found to be within the allowable limits.

**TABLE 1: Tower Component Stress vs. Capacity Summary:**

Component/ (Section No.)	Existing Component Size	Controlling Component/Elevation	Percent Capacity	Pass/Fail
Tower Leg (T7)	PiROD Truss Leg	Compression 60'-80'	95.1%	Pass
Diagonal (T7)	L3x3x5/16	Compression 60'-80'	99.2%	Pass
Top Girt (T1)	7/8" SR	Compression 150'-170'	3.9%	Pass
Bottom Girt (T1)	7/8" SR	Compression 150'-170'	3.7%	Pass
Mid Girt (T4)	L3x3x3/16	Compression 100'-120'	24.8%	Pass
<b>Bolt Checks</b>				
Anchor Bolts	(6) 1-1/4"	Tension	74.0%	Pass

**TABLE 2: Foundation Summary**

Foundation	Component	Stress (% capacity/FOS)	Pass/Fail	Comments:
Previously Modified Drilled Concrete Caisson	Uplift	87.0%/2.30	Pass	Min. F.O.S of 2.0 req'd per IBC 2003 Section 3108.4.2

## 5. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis indicate that the tower and foundation have the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.**

### Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.
2. Tower is properly installed and maintained.
3. All members are as specified in the original design documents and are in good condition.
4. All required members are in place.
5. All bolts are in place and are properly tightened.
6. Tower is in plumb condition.
7. All member protective coatings are in good condition.
8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
9. Foundations were properly constructed to support original design loads as specified in the original design documents.
10. All coaxial cable is installed as specified in Section 6 of this report.

URS is not responsible for any changes/alterations completed prior to or hereafter in which URS is not or was not directly involved. Changes/alterations include but are not limited to:

- A. Adding antennas
- B. Removing/replacing antennas
- C. Adding coaxial cables

URS hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact URS. URS disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

### Ongoing and Periodic Inspection and Maintenance:

After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

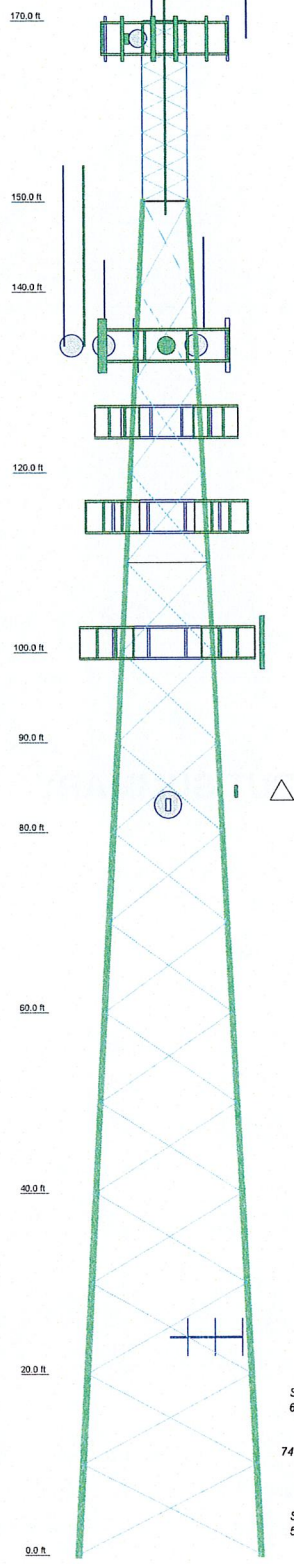
The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

## 6. DRAWINGS AND DATA

## **TNX TOWER INPUT/OUTPUT SUMMARY**



Section	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Legs	SR 7/8	SR 7/8	SR 7/8	SR 7/8	SR 7/8	SR 7/8	SR 7/8	SR 7/8	SR 7/8	SR 7/8	SR 7/8	SR 7/8	SR 7/8	SR 7/8
Diagonal	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50
Top Chords	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8	L3x3x1/8
Mid Chords	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Bottom Chords	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Flare Width (ft)	20	19	18	17	16	15	14	13	12	11	10	9	8	7
# Panels @ (ft)	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958	8 @ 2.48958
Weight (K)	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4



**DESIGNED APPURTENANCE LOADING**

TYPE	ELEVATION	TYPE	ELEVATION
101-80-08-0-01 (Municipal)	183	APX16DWV-16DWV-S (T-Mobile)	125.5
15' Mount Pipe (Municipal)	179.75	APX16DWV-16DWV-S (T-Mobile)	125.5
2.5' x 20" Whip (Municipal)	178	AM-X-CD-16-65-00T-RET (6) (ATI)	115
3' Dia 20' Omni (Municipal)	178	7770 (ATI)	115
2.5' x 14' Omni (Municipal)	175	7770 (ATI)	115
2.5' x 14' Omni (Municipal)	175	7770 (ATI)	115
2.5' x 14' Omni (Municipal)	175	7770 (ATI)	115
1.5' x 12' Omni (Municipal)	174	7770 (ATI)	115
PTP48600 (CromwellFD)	168	7770 (ATI)	115
950G6SVTZE-M (Sprint)	168	PIROD 12' Lightweight T-Frame (ATI)	115
950G6SVTZE-M (Sprint)	168	PIROD 12' Lightweight T-Frame (ATI)	115
950G6SVTZE-M (Sprint)	168	PIROD 12' Lightweight T-Frame (ATI)	115
950G6SVTZE-M (Sprint)	168	(2) TMA (shielded) (ATI)	115
950G6SVTZE-M (Sprint)	168	(2) TMA (shielded) (ATI)	115
950G6SVTZE-M (Sprint)	168	(2) TMA (shielded) (ATI)	115
SU-RA-HP-2.4 Antenna (Municipal)	168	(2) TMA (shielded) (ATI)	115
9 Arm Halo Mount (Municipal)	168	(2) TMA (shielded) (ATI)	115
HPD2-4.7 (CromwellFD)	168	(2) TMA (shielded) (ATI)	115
APXV18-205517S-C w/ mounting hardware	159.5	(2) Surge Suppressor (ATI)	115
APXV18-205517S-C w/ mounting hardware	159.5	(2) REMOTE RADIO HEAD (RRH) (ATI)	115
APXV18-205517S-C w/ mounting hardware	159.5	(2) REMOTE RADIO HEAD (RRH) (ATI)	115
SC420-HP1DF (Municipal)	158.5	(2) REMOTE RADIO HEAD (RRH) (ATI)	115
3' Dia 20' Omni (Municipal)	144	AM-X-CD-16-65-00T-RET (6) (ATI)	115
3' Dia 20' Omni (Municipal)	144	AM-X-CD-16-65-00T-RET (6) (ATI)	115
2.5' x 20" Whip (Municipal)	144	SC-E 6014 rev2 (Verizon)	101
2' Dia 15' Omni (Municipal)	141	SWCP 2x5514 (Verizon)	101
1.5' x 10' Omni (Municipal)	139	BXA-171063-128F (Verizon)	101
9' Whip (Municipal)	138.5	SC-E 6014 rev2 (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	SC-E 6014 rev2 (Verizon)	101
Argus LLPX10R (Clearwire)	134	BXA-17063-4CF-EDN (Verizon)	101
Argus LLPX10R (Clearwire)	134	BXA-171063-128F (Verizon)	101
Argus LLPX10R (Clearwire)	134	SC-E 6014 rev2 (Verizon)	101
PIROD 20' Universal Platform (Municipal)	134	SC-E 6014 rev2 (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	SWCP 2x5514 (Verizon)	101
VHLP2.5-180 (Clearwire)	134	BXA-171063-128F (Verizon)	101
VHLP2.5-180 (Clearwire)	134	SC-E 6014 rev2 (Verizon)	101
VHLP2.5-180 (Clearwire)	134	(2) Diplexer (Verizon)	101
VHLP2-180 (Clearwire)	134	(2) Diplexer (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	(2) Diplexer (Verizon)	101
Andrew Twin AWS TMA (T-Mobile)	125.5	PIROD 12' Lightweight T-Frame (Verizon)	101
Andrew Twin AWS TMA (T-Mobile)	125.5	PIROD 12' Lightweight T-Frame (Verizon)	101
Andrew Twin AWS TMA (T-Mobile)	125.5	PIROD 12' Lightweight T-Frame (Verizon)	101
APX16DWV-16DWV-S-A20 (T-Mobile)	125.5	3'x2'x22" Panel	87
APX16DWV-16DWV-S-A20 (T-Mobile)	125.5	TMA	84.5
APX16DWV-16DWV-S-A20 (T-Mobile)	125.5	3' Stand-off	83.5
PIROD 10' Lightweight T-Frame (T-Mobile)	125.5	3' Stand-off	83.5
PIROD 10' Lightweight T-Frame (T-Mobile)	125.5	3' Dish	83
PIROD 10' Lightweight T-Frame (T-Mobile)	125.5	TMA	83
Twin PCS TMA (T-Mobile)	125.5	3'x2'x22" Panel	80
Twin PCS TMA (T-Mobile)	125.5	Camera	30
Twin PCS TMA (T-Mobile)	125.5	FC9013N	24
APX16DWV-16DWV-S (T-Mobile)	125.5		

**SYMBOL LIST**

MARK	SIZE	MARK	SIZE
A	Prod 105217 reinf w/ 1" dia bar		

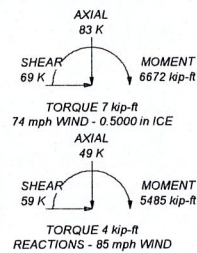
**MATERIAL STRENGTH**

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

**TOWER DESIGN NOTES**

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 99.2%

MAX. CORNER REACTIONS AT BASE:  
 DOWN: 413 K  
 UPLIFT: -354 K  
 SHEAR: 46 K



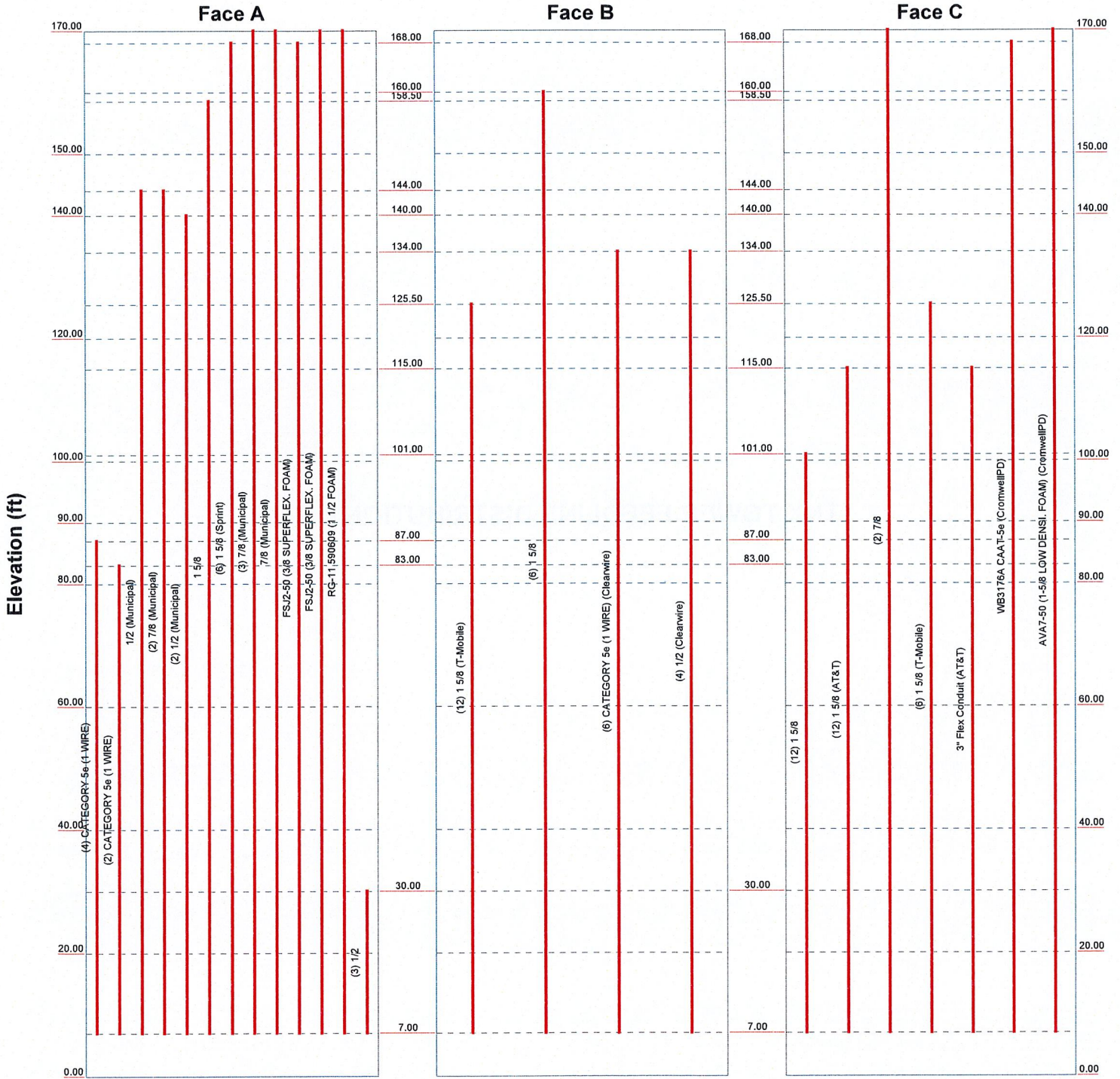
<b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	Job: <b>PIROD U20'-0"x170' Lattice Tower</b>
	Project: <b>VZ5-133 (Rev. 2)</b>
	Client: <b>Verizon</b>
	Code: <b>TIA/EIA-222-F</b>
	Date: <b>05/20/13</b>
Drawn by: <b>Michael Dalickas</b>	App'd:
Scale: <b>NTS</b>	Scale:
Path:	Dwg No. <b>E-1</b>

## TNX TOWER FEEDLINE DISTRIBUTION CHART



# Feedline Distribution Chart 0' - 170'

— Round   
 — Flat   
 — App In Face   
 — App Out Face   
 — Truss Leg

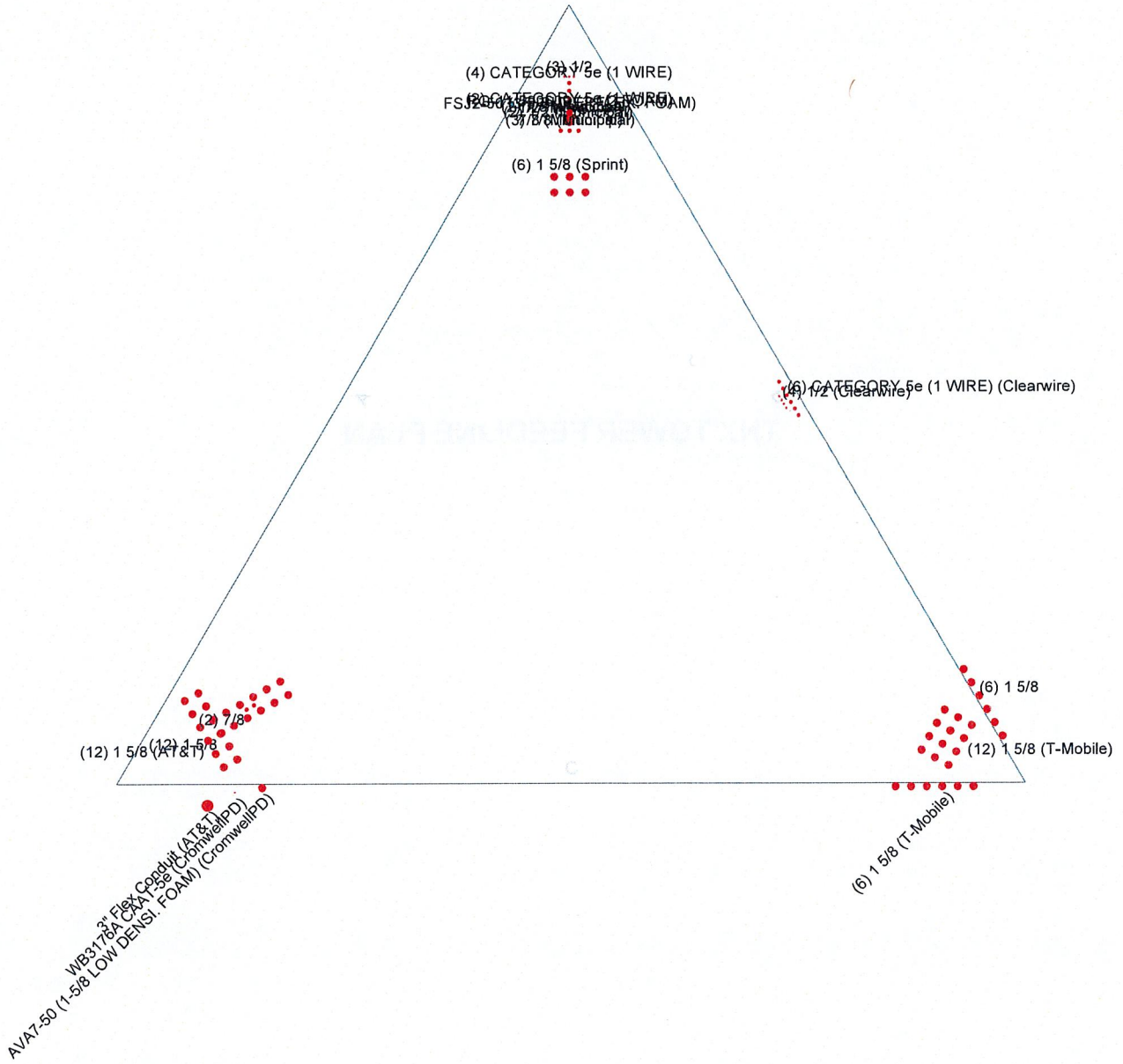


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500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991		
<b>Job: PiROD U20'-0"x170' Lattice Tower</b>		
Project: VZ5-133 (Rev. 2)		
Client: Verizon	Drawn by: Michael_Dalickas	App'd:
Code: TIA/EIA-222-F	Date: 05/20/13	Scale: NTS
Path:		Dwg No. E-7

# TNX TOWER FEEDLINE PLAN

# Feedline Plan

\_\_\_\_\_ Round   
 \_\_\_\_\_ Flat   
 \_\_\_\_\_ App In Face   
 \_\_\_\_\_ App Out Face   
 \_\_\_\_\_ Truss-Leg



<b>URS Corporation</b>		<b>Job: PiROD U20'-0"x170' Lattice Tower</b>	
500 Enterprise Drive, Suite 3B		Project: <b>VZ5-133 (Rev. 2)</b>	
Rocky Hill, CT 06067		Client: Verizon	Drawn by: Michael_Dalickas
Phone: 860-529-8882		Code: TIA/EIA-222-F	Date: 05/20/13
FAX: 860-529-3991		Path:	Scale: NTS
		Dwg No. E-7	

P:\08\Antenna Swap 5-20-2013\MERI Files\U20x170' PiROD Self-Supporting Lattice Tower.dwg

## TNX TOWER DETAILED OUTPUT



<b><i>inxTower</i></b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 1 of 42
	<b>Project</b> VZ5-133 (Rev. 2)	<b>Date</b> 09:59:18 05/20/13
	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

## Tower Input Data

The main tower is a 3x free standing tower with an overall height of 170.00 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 5.00 ft at the top and 20.00 ft at the base.

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

The following design criteria apply:

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 74 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

Weld together tower sections have flange connections..

Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..

Welds are fabricated with ER-70S-6 electrodes..

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

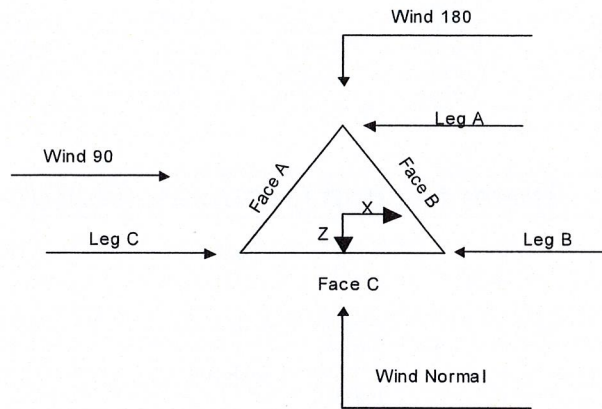
Stress ratio used in tower member design is 1.333.

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

## Options

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

<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PIROD U20'-0"x170' Lattice Tower	<b>Page</b> 2 of 42
	<b>Project</b> VZ5-133 (Rev. 2)	<b>Date</b> 09:59:18 05/20/13
	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas



**Triangular Tower**

### Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	170.00-150.00			5.00	1	20.00
T2	150.00-140.00		U6.0 105244	5.00	1	10.00
T3	140.00-120.00		U8.0 105216	6.00	1	20.00
T4	120.00-100.00		U10.0 105217 L3x3/16	8.00	1	20.00
T5	100.00-90.00		U12.0 105216	10.00	1	10.00
T6	90.00-80.00		U12.0 105216	11.00	1	10.00
T7	80.00-60.00		U14.0 105218	12.00	1	20.00
T8	60.00-40.00		U16.0 105219	14.00	1	20.00
T9	40.00-20.00		U18.0 105219	16.00	1	20.00
T10	20.00-0.00		U20.0 105219 L4x1/4	18.00	1	20.00

### 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
	ft	ft				in	in
T1	170.00-150.00	2.49	X Brace	No	No	0.0000	1.0000
T2	150.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T5	100.00-90.00	10.00	X Brace	No	No	0.0000	0.0000



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b>	PIROD U20'-0"x170' Lattice Tower	<b>Page</b>	3 of 42
	<b>Project</b>	VZ5-133 (Rev. 2)	<b>Date</b>	09:59:18 05/20/13
	<b>Client</b>	Verizon	<b>Designed by</b>	Michael_Dalickas

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
T6	90.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T7	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T8	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T10	20.00-0.00	10.00	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 170.00-150.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 150.00-140.00	Truss Leg	Pirod 105244	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 140.00-120.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T4 120.00-100.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T5 100.00-90.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T6 90.00-80.00	Truss Leg	Pirod 105217 reinf w/ 1" dia bar	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T7 80.00-60.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T8 60.00-40.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T9 40.00-20.00	Truss Leg	Pirod 105219 reinf w /1" dia bar	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T10 20.00-0.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Single Angle	L4x4x1/4	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 170.00-150.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 150.00-140.00	Single Angle	L3x3x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

### Tower Section Geometry (cont'd)









<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PIROD U20'-0"x170' Lattice Tower	<b>Page</b> 6 of 42
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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
T2 150.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 100.00-90.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 90.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T10 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

### Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 170.00-150.00	Flange	0.7500	0	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T2 150.00-140.00	Flange	1.0000	6	1.0000	1	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T3 140.00-120.00	Flange	1.0000	6	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T4 120.00-100.00	Flange	1.0000	6	1.0000	1	0.6250	0	0.6250	0	1.0000	1	0.6250	0	0.6250	0
T5 100.00-90.00	Flange	1.0000	6	1.0000	1	0.6250	0	0.0000	0	0.6250	0	0.6250	0	0.6250	0
T6 90.00-80.00	Flange	1.0000	6	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T7 80.00-60.00	Flange	1.0000	6	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T8 60.00-40.00	Flange	1.2500	6	1.2500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T9 40.00-20.00	Flange	1.2500	6	1.2500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T10 20.00-0.00	Flange	0.0000	0	1.2500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0

### Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield No	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	# Per Row	# Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
CATEGORY	A	No	Ar (Leg)	87.00 - 7.00	0.0000	0.1	4	4	1.0000	1.0000		0.21



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b>	PIROD U20'-0"x170' Lattice Tower	<b>Page</b>	7 of 42
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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
5e (1 WIRE) CATEGORY	A	No	Ar (Leg)	83.00 - 7.00	0.0000	0.12	2	2	1.0000	1.0000		0.21
5e (1 WIRE) 1/2 (Municipal)	A	No	Ar (Leg)	144.00 - 7.00	0.0000	0.125	1	1	0.5800	0.5800		0.25
7/8 (Municipal)	A	No	Ar (Leg)	144.00 - 7.00	0.0000	0.125	2	1	1.1100	1.1100		0.54
1/2 (Municipal)	A	No	Ar (Leg)	140.00 - 7.00	0.0000	0.13	2	1	0.5800	0.5800		0.25
1 5/8	A	No	Ar (Leg)	158.50 - 7.00	0.0000	0.13	1	1	1.9800	1.9800		1.04
1 5/8 (Sprint)	A	No	Ar (Leg)	168.00 - 7.00	0.0000	0.2	6	2	1.9800	1.9800		1.04
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.14	3	1	1.1100	1.1100		0.54
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.14	1	1	1.1100	1.1100		0.54
FSJ2-50 (3/8 SUPERFLEX. FOAM)	A	No	Ar (Leg)	168.00 - 7.00	0.0000	0.12	1	1	0.4300	0.4300		0.08
FSJ2-50 (3/8 SUPERFLEX. FOAM)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.12	1	1	0.4300	0.4300		0.08
RG-11 590609 (1 1/2 FOAM)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.12	1	1	1.5900	1.5900		0.94
1 5/8 (T-Mobile)	B	No	Ar (Leg)	125.50 - 7.00	0.0000	0.1	12	3	1.9800	1.9800		1.04
1 5/8	B	Yes	Ar (CfAe)	160.00 - 7.00	0.0000	0.4	6	6	1.9800	1.9800		1.04
1 5/8	C	No	Ar (Leg)	101.00 - 7.00	0.0000	0.17	12	6	1.9800	1.9800		1.04
1 5/8 (AT&T)	C	No	Ar (Leg)	115.00 - 7.00	0.0000	0.12	12	2	1.9800	1.9800		1.04
7/8 (T-Mobile)	C	No	Ar (Leg)	170.00 - 7.00	0.0000	0.17	2	2	1.1100	1.1100		0.54
1 5/8	C	Yes	Ar (CfAe)	125.50 - 7.00	0.0000	-0.4	6	6	1.9800	1.9800		1.04
CATEGORY 5e (1 WIRE) (Clearwire)	B	Yes	Ar (CfAe)	134.00 - 7.00	-2.0000	0	6	6	1.0000	1.0000		0.21
1/2 (Clearwire)	B	Yes	Ar (CfAe)	134.00 - 7.00	-4.0000	0	4	4	0.5800	0.5800		0.25
3" Flex Conduit (AT&T)	C	Yes	Ar (CfAe)	115.00 - 7.00	4.0000	0.4	1	1	0.0000	3.0000		3.00
1/2	A	No	Ar (Leg)	30.00 - 7.00	0.0000	0.08	3	1	0.5800	0.5800		0.25
WB3176A CAAT-5e (CromwellPD)	C	Yes	Ar (CfAe)	168.00 - 7.00	2.0000	0.37	1	1	0.3600	0.3600		0.06
AVA7-50 (1-5/8 LOW DENSI. FOAM) (CromwellPD)	C	Yes	Ar (CfAe)	170.00 - 7.00	0.0000	0.34	1	1	1.9800	1.9800		0.72

### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>I</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>I</sub> Out Face ft <sup>2</sup>	Weight K
T1	170.00-150.00	A	32.766	0.000	0.000	0.000	0.19

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Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
		B	38.966	0.000	0.000	0.000	0.06
		C	7.540	0.000	0.000	0.000	0.04
T2	150.00-140.00	A	19.204	0.000	0.000	0.000	0.11
		B	27.254	0.000	0.000	0.000	0.06
		C	3.800	0.000	0.000	0.000	0.02
T3	140.00-120.00	A	43.141	0.000	0.000	0.000	0.25
		B	76.400	0.000	0.000	0.000	0.23
		C	20.497	0.000	0.000	0.000	0.07
T4	120.00-100.00	A	72.704	0.000	0.000	0.000	0.25
		B	100.205	0.000	0.000	0.000	0.42
		C	87.809	0.000	0.000	0.000	0.41
T5	100.00-90.00	A	58.524	0.000	0.000	0.000	0.12
		B	50.102	0.000	0.000	0.000	0.21
		C	66.702	0.000	0.000	0.000	0.36
T6	90.00-80.00	A	61.358	0.000	0.000	0.000	0.13
		B	52.936	0.000	0.000	0.000	0.21
		C	66.702	0.000	0.000	0.000	0.36
T7	80.00-60.00	A	127.048	0.000	0.000	0.000	0.27
		B	110.205	0.000	0.000	0.000	0.42
		C	133.404	0.000	0.000	0.000	0.72
T8	60.00-40.00	A	127.048	0.000	0.000	0.000	0.27
		B	110.205	0.000	0.000	0.000	0.42
		C	133.404	0.000	0.000	0.000	0.72
T9	40.00-20.00	A	128.498	0.000	0.000	0.000	0.28
		B	111.655	0.000	0.000	0.000	0.42
		C	133.404	0.000	0.000	0.000	0.72
T10	20.00-0.00	A	84.466	0.000	0.000	0.000	0.19
		B	73.518	0.000	0.000	0.000	0.27
		C	86.712	0.000	0.000	0.000	0.47

### Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
T1	170.00-150.00	A	0.500	49.808	0.000	0.000	0.000	0.49
		B		57.675	0.000	0.000	0.000	0.15
		C		14.040	0.000	0.000	0.000	0.12
T2	150.00-140.00	A	0.500	29.371	0.000	0.000	0.000	0.29
		B		40.754	0.000	0.000	0.000	0.15
		C		7.133	0.000	0.000	0.000	0.06
T3	140.00-120.00	A	0.500	69.108	0.000	0.000	0.000	0.67
		B		103.961	15.727	0.000	0.000	0.64
		C		30.372	0.000	0.000	0.000	0.20
T4	120.00-100.00	A	0.500	100.004	0.000	0.000	0.000	0.67
		B		126.605	22.467	0.000	0.000	1.16
		C		108.726	0.000	0.000	0.000	0.99
T5	100.00-90.00	A	0.500	73.174	0.000	0.000	0.000	0.33
		B		63.302	11.233	0.000	0.000	0.58
		C		78.369	0.000	0.000	0.000	0.88
T6	90.00-80.00	A	0.500	74.841	4.000	0.000	0.000	0.38
		B		64.969	15.233	0.000	0.000	0.58
		C		78.369	0.000	0.000	0.000	0.88
T7	80.00-60.00	A	0.500	153.015	13.333	0.000	0.000	0.83
		B		133.271	35.800	0.000	0.000	1.16
		C		156.737	0.000	0.000	0.000	1.75
T8	60.00-40.00	A	0.500	153.015	13.333	0.000	0.000	0.83
		B		133.271	35.800	0.000	0.000	1.16



<b>inxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 9 of 42
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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
T9	40.00-20.00	C	0.500	156.737	0.000	0.000	0.000	1.75
		A		156.265	13.333	0.000	0.000	0.85
		B		136.521	35.800	0.000	0.000	1.16
T10	20.00-0.00	C	0.500	156.737	0.000	0.000	0.000	1.75
		A		103.685	8.667	0.000	0.000	0.57
		B		90.851	23.270	0.000	0.000	0.75
		C		101.879	0.000	0.000	0.000	1.14

### Feed Line Shielding

Section	Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>R</sub> Ice ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	A <sub>F</sub> Ice ft <sup>2</sup>
T1	170.00-150.00	A	0.000	0.000	0.000	0.000
		B	0.717	2.313	0.000	0.000
		C	0.278	1.088	0.000	0.000
T2	150.00-140.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.639	1.103	1.659
		C	0.000	0.155	0.217	0.403
T3	140.00-120.00	A	0.000	0.000	0.000	0.000
		B	0.000	1.449	2.581	4.348
		C	0.000	0.450	0.818	1.350
T4	120.00-100.00	A	0.000	0.000	0.000	0.000
		B	0.000	1.696	2.942	5.088
		C	0.000	1.224	2.399	3.673
T5	100.00-90.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.670	1.162	2.010
		C	0.000	0.503	0.991	1.508
T6	90.00-80.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.643	1.115	1.929
		C	0.000	0.483	0.951	1.448
T7	80.00-60.00	A	0.000	0.000	0.000	0.000
		B	0.000	1.225	2.125	3.676
		C	0.000	0.919	1.812	2.758
T8	60.00-40.00	A	0.000	0.000	0.000	0.000
		B	0.000	1.167	2.361	4.084
		C	0.000	0.876	2.013	3.065
T9	40.00-20.00	A	0.000	0.000	0.000	0.000
		B	0.000	1.126	2.279	3.942
		C	0.000	0.845	1.943	2.958
T10	20.00-0.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.713	1.649	2.852
		C	0.000	0.535	1.406	2.140

### Feed Line Center of Pressure

Section	Elevation ft	CP <sub>x</sub> in	CP <sub>z</sub> in	CP <sub>x</sub> Ice in	CP <sub>z</sub> Ice in
T1	170.00-150.00	0.8892	-4.2100	0.4083	-3.8130
T2	150.00-140.00	1.8435	-2.9532	1.4795	-2.8512
T3	140.00-120.00	4.7427	-3.0292	3.9235	-3.4374

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Section	Elevation	CP <sub>X</sub>	CP <sub>Z</sub>	CP <sub>X</sub> Ice	CP <sub>Z</sub> Ice
	ft	in	in	in	in
T4	120.00-100.00	3.9615	2.1334	4.0652	0.6492
T5	100.00-90.00	-0.5849	4.6213	0.7170	2.7208
T6	90.00-80.00	-0.5976	4.0673	0.7701	2.0093
T7	80.00-60.00	-0.6382	3.8557	0.8743	1.6309
T8	60.00-40.00	-0.7449	4.2370	0.9393	1.7764
T9	40.00-20.00	-0.8017	4.3832	1.0628	1.4785
T10	20.00-0.00	-0.7683	3.6823	0.9105	0.8923

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>A</sub> A <sub>A</sub> Front ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Side ft <sup>2</sup>	Weight K	
101-90-08-0-01 (Municipal)	A	From Leg	2.50	0.0000	183.00	No Ice	3.33	3.33	0.04
			2.00			1/2" Ice	4.31	4.31	0.06
15' Mount Pipe (Municipal)	A	From Leg	2.50	0.0000	179.75	No Ice	4.50	4.50	0.09
			2.00			1/2" Ice	6.03	6.03	0.12
2.5" x 20'6" Whip (Municipal)	C	From Face	0.00	0.0000	178.00	No Ice	5.14	5.14	0.15
			0.00			1/2" Ice	7.24	7.24	0.19
3" Dia 20' Omni (Municipal)	B	From Face	9.00	0.0000	178.00	No Ice	4.00	4.00	0.06
			0.00			1/2" Ice	6.00	6.00	0.10
2.5" x 14' Omni (Municipal)	C	From Face	0.00	0.0000	175.00	No Ice	3.50	3.50	0.03
			0.00			1/2" Ice	4.93	4.93	0.06
2.5" x 14' Omni (Municipal)	C	From Face	0.00	0.0000	175.00	No Ice	3.50	3.50	0.03
			0.00			1/2" Ice	4.93	4.93	0.06
2.5" x 14' Omni (Municipal)	C	From Face	0.00	0.0000	175.00	No Ice	3.50	3.50	0.03
			0.00			1/2" Ice	4.93	4.93	0.06
1.5" x 12' Omni (Municipal)	A	From Face	2.50	0.0000	174.00	No Ice	1.50	1.50	0.06
			4.00			1/2" Ice	2.52	2.52	0.07
PTP49600 (CromwellPD)	C	From Leg	2.00	0.0000	168.00	No Ice	2.04	0.53	0.01
			0.00			1/2" Ice	2.24	0.65	0.02
950G65VTZE-M (Sprint)	A	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
			0.00			1/2" Ice	4.37	3.15	0.03
950G65VTZE-M (Sprint)	C	From Leg	2.50	0.0000	168.00	No Ice	3.99	2.78	0.01
			0.00			1/2" Ice	4.37	3.15	0.03
950G65VTZE-M (Sprint)	C	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
			1.25			1/2" Ice	4.37	3.15	0.03
950G65VTZE-M (Sprint)	C	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
			-1.25			1/2" Ice	4.37	3.15	0.03
			0.00						



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b>	PIROD U20'-0"x170' Lattice Tower	<b>Page</b>	11 of 42
	<b>Project</b>	VZ5-133 (Rev. 2)	<b>Date</b>	09:59:18 05/20/13
	<b>Client</b>	Verizon	<b>Designed by</b>	Michael_Dalickas

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>1</sub>		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
950G65VTZE-M (Sprint)	B	From Leg	2.50 0.00 0.00		0.0000	168.00	No Ice 1/2" Ice	3.99 4.37	2.78 3.15	0.01 0.03
950G65VTZE-M (Sprint)	B	From Face	6.00 1.25 0.00		0.0000	168.00	No Ice 1/2" Ice	3.99 4.37	2.78 3.15	0.01 0.03
SU-RA-HP-2.4 Antenna (Municipal)	B	From Face	3.00 2.50 0.00		0.0000	168.00	No Ice 1/2" Ice	0.80 0.93	0.37 0.47	0.00 0.01
9 Arm Halo Mount (Municipal)	C	None			0.0000	168.00	No Ice 1/2" Ice	62.60 80.40	62.60 80.40	3.60 4.80
APXV18-206517S-C w/ mounting hardware	C	From Leg	1.00 0.00 0.00		0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
APXV18-206517S-C w/ mounting hardware	B	From Leg	1.00 0.00 0.00		0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
APXV18-206517S-C w/ mounting hardware	A	From Leg	1.00 0.00 0.00		0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
2.5" x 20'6" Whip (Municipal)	A	From Face	6.00 9.00 0.00		0.0000	144.00	No Ice 1/2" Ice	5.14 7.24	5.14 7.24	0.15 0.19
3" Dia 20' Omni (Municipal)	A	From Face	6.00 -9.00 0.00		0.0000	144.00	No Ice 1/2" Ice	4.00 6.00	4.00 6.00	0.06 0.10
3" Dia 20' Omni (Municipal)	C	From Face	6.00 9.00 0.00		0.0000	144.00	No Ice 1/2" Ice	4.00 6.00	4.00 6.00	0.06 0.10
2" Dia 15' Omni (Municipal)	B	From Face	6.00 -5.00 0.00		0.0000	141.00	No Ice 1/2" Ice	3.20 4.83	3.20 4.83	0.04 0.06
1.5" x 10' Omni (Municipal)	B	From Face	6.00 5.00 0.00		0.0000	139.00	No Ice 1/2" Ice	1.50 2.52	1.50 2.52	0.06 0.07
9' Whip (Municipal)	A	From Face	6.00 0.00 0.00		0.0000	138.50	No Ice 1/2" Ice	5.85 7.66	5.85 7.66	0.12 0.17
REMOTE RADIO HEAD (RRH) (Clearwire)	C	From Face	6.00 7.00 0.00		0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
REMOTE RADIO HEAD (RRH) (Clearwire)	B	From Face	6.00 0.00 0.00		0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
REMOTE RADIO HEAD (RRH) (Clearwire)	A	From Face	6.00 7.00 0.00		0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
Argus LLPX310R (Clearwire)	C	From Face	6.00 7.00 0.00		0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
Argus LLPX310R (Clearwire)	B	From Face	6.00 0.00 0.00		0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
Argus LLPX310R (Clearwire)	A	From Face	6.00 7.00 0.00		0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
PIROD 20' Universal	C	None			0.0000	134.00	No Ice	33.10	33.10	2.27

<b>inxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b>	Page	
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		Michael_Dalickas	

Description	Face or Leg	Offset Type	Offsets: Horiz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
Platform (Municipal)						1/2" Ice	47.10	47.10	2.70
Twin PCS TMA (T-Mobile)	C	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	0.77 0.96	0.36 0.52	0.01 0.02
Twin PCS TMA (T-Mobile)	B	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	0.77 0.96	0.36 0.52	0.01 0.02
Twin PCS TMA (T-Mobile)	A	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	0.77 0.96	0.36 0.52	0.01 0.02
APX16DWV-16DWV-S (T-Mobile)	C	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	7.08 7.76	2.15 2.89	0.04 0.08
APX16DWV-16DWV-S (T-Mobile)	B	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	7.08 7.76	2.15 2.89	0.04 0.08
APX16DWV-16DWV-S (T-Mobile)	A	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	7.08 7.76	2.15 2.89	0.04 0.08
Andrew Twin AWS TMA (T-Mobile)	C	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	0.50 0.62	0.22 0.34	0.01 0.02
Andrew Twin AWS TMA (T-Mobile)	B	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	0.50 0.62	0.22 0.34	0.01 0.02
Andrew Twin AWS TMA (T-Mobile)	A	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	0.50 0.62	0.22 0.34	0.01 0.02
APX16DWV-16DWVS-A20 (T-Mobile)	C	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	7.08 7.76	2.15 2.89	0.04 0.08
APX16DWV-16DWVS-A20 (T-Mobile)	B	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	7.08 7.76	2.15 2.89	0.04 0.08
APX16DWV-16DWVS-A20 (T-Mobile)	A	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	7.08 7.76	2.15 2.89	0.04 0.08
PiROD 10' Lightweight T-Frame (T-Mobile)	C	From Leg	2.00 0.00 0.00	0.0000	125.50	No Ice 1/2" Ice	9.30 14.50	9.30 14.50	0.25 0.34
PiROD 10' Lightweight T-Frame (T-Mobile)	B	From Leg	2.00 0.00 0.00	0.0000	125.50	No Ice 1/2" Ice	9.30 14.50	9.30 14.50	0.25 0.34
PiROD 10' Lightweight T-Frame (T-Mobile)	A	From Leg	2.00 0.00 0.00	0.0000	125.50	No Ice 1/2" Ice	9.30 14.50	9.30 14.50	0.25 0.34
Surge Suppressor (AT&T)	C	From Leg	0.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice	0.80 0.94	0.80 0.94	0.03 0.04
(2) REMOTE RADIO HEAD (RRH) (AT&T)	C	From Leg	0.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
(2) REMOTE RADIO HEAD (RRH) (AT&T)	B	From Leg	0.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
(2) REMOTE RADIO HEAD (AT&T)	A	From Leg	0.00	0.0000	115.00	No Ice	1.82	0.83	0.03



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b>	PiROD U20'-0"x170' Lattice Tower	<b>Page</b>	13 of 42
	<b>Project</b>	VZ5-133 (Rev. 2)	<b>Date</b>	09:59:18 05/20/13
	<b>Client</b>	Verizon	<b>Designed by</b>	Michael_Dalickas

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>A</sub> Front	C <sub>A</sub> A <sub>A</sub> Side	Weight	
			Horz	Vert						ft
(RRH)				0.00		1/2" Ice	2.00	0.97	0.04	
(AT&T)				0.00						
AM-X-CD-16-65-00T-RET (6')	C	From Leg		4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(AT&T)				0.00			1/2" Ice	8.81	5.09	0.10
AM-X-CD-16-65-00T-RET (6')	B	From Leg		4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(AT&T)				0.00			1/2" Ice	8.81	5.09	0.10
AM-X-CD-16-65-00T-RET (6')	A	From Leg		4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(AT&T)				0.00			1/2" Ice	8.81	5.09	0.10
7770 (AT&T)	C	From Leg		4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)				-6.00			1/2" Ice	10.61	6.15	0.07
7770 (AT&T)	C	From Leg		4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)				6.00			1/2" Ice	10.61	6.15	0.07
7770 (AT&T)	B	From Leg		4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)				-6.00			1/2" Ice	10.61	6.15	0.07
7770 (AT&T)	B	From Leg		4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)				6.00			1/2" Ice	10.61	6.15	0.07
7770 (AT&T)	A	From Leg		4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)				-6.00			1/2" Ice	10.61	6.15	0.07
7770 (AT&T)	A	From Leg		4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)				6.00			1/2" Ice	10.61	6.15	0.07
PiROD 12' Lightweight T-Frame (AT&T)	C	From Leg		2.00	0.0000	115.00	No Ice	10.20	10.20	0.25
(AT&T)				0.00			1/2" Ice	16.20	16.20	0.35
PiROD 12' Lightweight T-Frame (AT&T)	B	From Leg		2.00	0.0000	115.00	No Ice	10.20	10.20	0.25
(AT&T)				0.00			1/2" Ice	16.20	16.20	0.35
PiROD 12' Lightweight T-Frame (AT&T)	A	From Leg		2.00	0.0000	115.00	No Ice	10.20	10.20	0.25
(AT&T)				0.00			1/2" Ice	16.20	16.20	0.35
(2) TMA (shielded) (AT&T)	C	From Leg		4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)				-6.00			1/2" Ice	0.00	0.00	0.01
(2) TMA (shielded) (AT&T)	C	From Leg		4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)				6.00			1/2" Ice	0.00	0.00	0.01
(2) TMA (shielded) (AT&T)	B	From Leg		4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)				-6.00			1/2" Ice	0.00	0.00	0.01
(2) TMA (shielded) (AT&T)	B	From Leg		4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)				6.00			1/2" Ice	0.00	0.00	0.01
(2) TMA (shielded) (AT&T)	A	From Leg		4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)				-6.00			1/2" Ice	0.00	0.00	0.01
(2) TMA (shielded) (AT&T)	A	From Leg		4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)				6.00			1/2" Ice	0.00	0.00	0.01
(2) Diplexer	C	From Leg		4.00	0.0000	101.00	No Ice	0.23	0.17	0.01

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	<b>Project</b>	VZ5-133 (Rev. 2)	<b>Date</b>	09:59:18 05/20/13
	<b>Client</b>	Verizon	<b>Designed by</b>	Michael_Dalickas

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>1</sub> Front	C <sub>A</sub> A <sub>1</sub> Side	Weight
			Horz	Vert					
(Verizon)			6.00	0.00		1/2" Ice	0.30	0.24	0.01
(2) Diplexer (Verizon)	B	From Leg	4.00	0.00	0.0000	101.00	No Ice	0.23	0.17
			6.00	0.00		1/2" Ice	0.30	0.24	0.01
(2) Diplexer (Verizon)	A	From Leg	4.00	0.00	0.0000	101.00	No Ice	0.23	0.17
			6.00	0.00		1/2" Ice	0.30	0.24	0.01
PiROD 12' Lightweight T-Frame (Verizon)	C	From Leg	2.00	0.00	0.0000	101.00	No Ice	10.20	10.20
			0.00	0.00		1/2" Ice	16.20	16.20	0.35
PiROD 12' Lightweight T-Frame (Verizon)	B	From Leg	2.00	0.00	0.0000	101.00	No Ice	10.20	10.20
			0.00	0.00		1/2" Ice	16.20	16.20	0.35
PiROD 12' Lightweight T-Frame (Verizon)	A	From Leg	2.00	0.00	0.0000	101.00	No Ice	10.20	10.20
			0.00	0.00		1/2" Ice	16.20	16.20	0.35
SC-E 6014 rev2 (Verizon)	C	From Leg	4.00	-6.00	0.0000	101.00	No Ice	3.55	3.34
			0.00	0.00		1/2" Ice	3.89	3.68	0.04
SWCP 2x5514 (Verizon)	C	From Leg	4.00	-4.00	0.0000	101.00	No Ice	7.01	5.70
			0.00	0.00		1/2" Ice	7.44	6.12	0.07
BXA-171063-12BF (Verizon)	C	From Leg	4.00	0.00	0.0000	101.00	No Ice	4.73	3.57
			0.00	0.00		1/2" Ice	5.18	4.01	0.04
SC-E 6014 rev2 (Verizon)	C	From Leg	4.00	6.00	0.0000	101.00	No Ice	3.55	3.34
			0.00	0.00		1/2" Ice	3.89	3.68	0.04
SC-E 6014 rev2 (Verizon)	B	From Leg	4.00	-6.00	0.0000	101.00	No Ice	3.55	3.34
			0.00	0.00		1/2" Ice	3.89	3.68	0.04
BXA-70063-6CF-EDIN (Verizon)	B	From Leg	4.00	-4.00	0.0000	101.00	No Ice	7.73	4.16
			0.00	0.00		1/2" Ice	8.27	4.60	0.06
BXA-171063-12BF (Verizon)	B	From Leg	4.00	0.00	0.0000	101.00	No Ice	4.73	3.57
			0.00	0.00		1/2" Ice	5.18	4.01	0.04
SC-E 6014 rev2 (Verizon)	B	From Leg	4.00	6.00	0.0000	101.00	No Ice	3.55	3.34
			0.00	0.00		1/2" Ice	3.89	3.68	0.04
SC-E 6014 rev2 (Verizon)	A	From Leg	4.00	-6.00	0.0000	101.00	No Ice	3.55	3.34
			0.00	0.00		1/2" Ice	3.89	3.68	0.04
SWCP 2x5514 (Verizon)	A	From Leg	4.00	-4.00	0.0000	101.00	No Ice	7.01	5.70
			0.00	0.00		1/2" Ice	7.44	6.12	0.07
BXA-171063-12BF (Verizon)	A	From Leg	4.00	0.00	0.0000	101.00	No Ice	4.73	3.57
			0.00	0.00		1/2" Ice	5.18	4.01	0.04
SC-E 6014 rev2 (Verizon)	A	From Leg	4.00	6.00	0.0000	101.00	No Ice	3.55	3.34
			0.00	0.00		1/2" Ice	3.89	3.68	0.04
3"x2"x22" Panel	B	From Leg	2.00	0.00	0.0000	87.00	No Ice	0.65	0.47
			0.00	0.00		1/2" Ice	0.81	0.61	0.05
TMA	B	From Leg	2.00	0.00	0.0000	84.50	No Ice	1.06	0.45



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	<b>Client</b>	Verizon	<b>Designed by</b>	Michael_Dalickas

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>A</sub> Front	C <sub>A</sub> A <sub>A</sub> Side	Weight
			Horz	Lateral					
			0.00			1/2" Ice	1.21	0.57	0.01
3' Stand-off	A	From Leg	0.00		0.0000	No Ice	1.00	2.00	0.05
			1.50			1/2" Ice	1.20	2.70	0.07
3' Stand-off	B	From Leg	0.00		0.0000	No Ice	1.00	2.00	0.05
			1.50			1/2" Ice	1.20	2.70	0.07
TMA	A	From Leg	0.00		0.0000	No Ice	1.06	0.45	0.00
			2.00			1/2" Ice	1.21	0.57	0.01
3"x2"x22" Panel	B	From Leg	0.00		0.0000	No Ice	0.65	0.47	0.05
			2.00			1/2" Ice	0.81	0.61	0.05
Camera	A	From Leg	0.00		0.0000	No Ice	0.50	0.50	0.01
			0.00			1/2" Ice	0.60	0.60	0.02
PC9013N	A	From Leg	0.00		0.0000	No Ice	0.46	0.46	0.00
			1.00			1/2" Ice	0.52	0.52	0.00
SC420-HF1LDF (Municipal)	C	From Face	0.00		0.0000	No Ice	2.14	2.14	0.02
			0.00			1/2" Ice	3.02	3.02	0.03

### Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz	Lateral							ft
3' Dish	A	Paraboloid w/o Radome	From Leg	2.00		0.0000		83.00	3.00	No Ice	7.07	0.23
				0.00						1/2" Ice	7.47	0.27
VHLP2.5-180 (Clearwire)	A	Paraboloid w/o Radome	From Face	6.00		0.0000		134.00	2.50	No Ice	4.90	0.07
				0.00						1/2" Ice	5.24	0.10
VHLP2.5-180 (Clearwire)	A	Paraboloid w/o Radome	From Face	6.00		0.0000		134.00	2.50	No Ice	4.90	0.07
				-7.00						1/2" Ice	5.24	0.10
VHLP2.5-180 (Clearwire)	B	Paraboloid w/o Radome	From Face	6.00		0.0000		134.00	2.50	No Ice	4.90	0.07
				-7.00						1/2" Ice	5.24	0.10
VHLP2-180 (Clearwire)	C	Paraboloid w/o Radome	From Face	6.00		0.0000		134.00	2.00	No Ice	3.14	0.03
				0.00						1/2" Ice	3.41	0.04
HPD2-4.7 (CromwellPD)	A	Paraboloid w/Radome	From Face	2.00		0.0000		168.00	2.00	No Ice	3.14	0.03
				0.00						1/2" Ice	3.41	0.04

<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 16 of 42
	<b>Project</b> VZ5-133 (Rev. 2)	<b>Date</b> 09:59:18 05/20/13
	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

### Truss-Leg Properties

Section Designation	Area <i>in</i> <sup>2</sup>	Area Ice <i>in</i> <sup>2</sup>	Self Weight <i>K</i>	Ice Weight <i>K</i>	Equiv. Diameter <i>in</i>	Equiv. Diameter Ice <i>in</i>	Leg Area <i>in</i> <sup>2</sup>
Pirod 105244	1026.8606	1727.9786	0.56	0.21	7.1310	11.9999	3.6816
Pirod 105216	1998.0891	3357.4497	0.51	0.43	6.9378	11.6578	3.6816
Pirod 105217	2130.7479	3520.4599	0.62	0.44	7.3984	12.2238	5.3014
Pirod 105217	2130.7479	3520.4599	0.62	0.44	7.3984	12.2238	5.3014
Pirod 105217 reinf w/ 1" dia bar	2291.5652	3727.7657	0.79	0.46	7.9568	12.9436	7.6570
Pirod 105218	2263.4687	3690.8612	0.75	0.46	7.8593	12.8155	7.2158
Pirod 105219	2441.8688	3942.2854	0.94	0.49	8.4787	13.6885	9.4248
Pirod 105219 reinf w /1" dia bar	2571.0468	4121.6676	1.11	0.50	8.9272	14.3113	11.7803
Pirod 105220	2578.8005	4132.5504	1.12	0.50	8.9542	14.3491	11.9282

### Tower Pressures - No Ice

$G_H = 1.125$

Section Elevation <i>ft</i>	<i>z</i> <i>ft</i>	$K_z$	$q_z$ <i>psf</i>	$A_G$ <i>ft</i> <sup>2</sup>	$F_{ac}$ <i>e</i>	$A_F$ <i>ft</i> <sup>2</sup>	$A_R$ <i>ft</i> <sup>2</sup>	$A_{leg}$ <i>ft</i> <sup>2</sup>	Leg %	$C_{sA_i}$ <i>In Face</i> <i>ft</i> <sup>2</sup>	$C_{sA_o}$ <i>Out Face</i> <i>ft</i> <sup>2</sup>	
T1 170.00-150.00	160.00	1.57	29	102.917	A	0.000	45.634	5.833	12.78	0.000	0.000	
					B	0.000	51.117		11.41	0.000	0.000	
					C	0.000	20.129		28.98	0.000	0.000	
T2 150.00-140.00	145.00	1.526	28	66.055	A	5.476	31.109	11.905	32.54	0.000	0.000	
					B	4.373			39.159	27.35	0.000	0.000
					C	5.258			15.705	56.79	0.000	0.000
T3 140.00-120.00	130.00	1.48	27	162.111	A	10.467	66.306	23.165	30.17	0.000	0.000	
					B	7.886			99.564	21.56	0.000	0.000
					C	9.650			43.661	43.45	0.000	0.000
T4 120.00-100.00	110.00	1.411	26	202.528	A	13.964	97.407	24.703	22.18	0.000	0.000	
					B	11.023			124.907	18.17	0.000	0.000
					C	11.566			112.512	19.91	0.000	0.000
T5 100.00-90.00	95.00	1.353	25	116.264	A	6.561	70.875	12.351	15.95	0.000	0.000	
					B	5.399			62.454	18.20	0.000	0.000
					C	5.570			79.053	14.60	0.000	0.000
T6 90.00-80.00	85.00	1.31	24	126.517	A	6.959	74.641	13.283	16.28	0.000	0.000	
					B	5.844			66.219	18.43	0.000	0.000
					C	6.008			79.985	15.45	0.000	0.000
T7 80.00-60.00	70.00	1.24	23	282.945	A	15.144	153.290	26.241	15.58	0.000	0.000	
					B	13.019			136.446	17.56	0.000	0.000
					C	13.333			159.645	15.17	0.000	0.000
T8 60.00-40.00	50.00	1.126	21	323.362	A	19.635	155.358	28.309	16.18	0.000	0.000	
					B	17.274			138.514	18.17	0.000	0.000
					C	17.622			161.713	15.79	0.000	0.000
T9 40.00-20.00	30.00	1	18	363.756	A	21.661	158.305	29.807	16.56	0.000	0.000	
					B	19.382			141.462	18.53	0.000	0.000
					C	19.718			163.211	16.29	0.000	0.000
T10 20.00-0.00	10.00	1	18	403.780	A	27.125	114.363	29.897	21.13	0.000	0.000	
					B	25.476			103.415	23.20	0.000	0.000
					C	25.719			116.609	21.01	0.000	0.000



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b>	PIROD U20'-0"x170' Lattice Tower	<b>Page</b>	17 of 42
	<b>Project</b>	VZ5-133 (Rev. 2)	<b>Date</b>	09:59:18 05/20/13
	<b>Client</b>	Verizon	<b>Designed by</b>	Michael_Dalickas

**Tower Pressure - With Ice**

$G_H = 1.125$

Section Elevation	z	$K_z$	$q_z$	$t_z$	$A_G$	F a c e	$A_F$	$A_R$	$A_{leg}$	Leg %	$C_{AA}$ In Face	$C_{AA}$ Out Face
ft	ft		psf	in	ft <sup>2</sup>		ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>		ft <sup>2</sup>	ft <sup>2</sup>
T1 170.00-150.00	160.00	1.57	22	0.5000	104.583	A	0.000	74.048	9.167	12.38	0.000	0.000
						B	0.000	79.601		11.52	0.000	0.000
						C	0.000	37.192		24.65	0.000	0.000
T2 150.00-140.00	145.00	1.526	21	0.5000	66.890	A	5.476	51.513	20.033	35.15	0.000	0.000
						B	3.816	62.257		30.32	0.000	0.000
						C	5.073	29.121		58.59	0.000	0.000
T3 140.00-120.00	130.00	1.48	21	0.5000	163.780	A	10.467	111.521	38.924	31.91	0.000	0.000
						B	21.845	144.925		23.34	0.000	0.000
						C	9.117	72.335		47.79	0.000	0.000
T4 120.00-100.00	110.00	1.411	20	0.5000	204.197	A	13.964	145.473	40.814	25.60	0.000	0.000
						B	31.343	170.377		20.23	0.000	0.000
						C	10.292	152.971		25.00	0.000	0.000
T5 100.00-90.00	95.00	1.353	19	0.5000	117.098	A	6.561	95.768	20.407	19.94	0.000	0.000
						B	15.784	85.226		20.20	0.000	0.000
						C	5.053	100.460		19.34	0.000	0.000
T6 90.00-80.00	85.00	1.31	18	0.5000	127.351	A	10.959	98.769	21.609	19.69	0.000	0.000
						B	20.263	88.254		19.91	0.000	0.000
						C	5.511	101.814		20.13	0.000	0.000
T7 80.00-60.00	70.00	1.24	17	0.5000	284.614	A	28.477	200.853	42.789	18.66	0.000	0.000
						B	47.268	179.884		18.84	0.000	0.000
						C	12.386	203.655		19.81	0.000	0.000
T8 60.00-40.00	50.00	1.126	16	0.5000	325.031	A	32.968	204.329	45.704	19.26	0.000	0.000
						B	51.351	183.419		19.47	0.000	0.000
						C	16.570	207.176		20.43	0.000	0.000
T9 40.00-20.00	30.00	1	14	0.5000	365.425	A	34.994	210.238	47.784	19.49	0.000	0.000
						B	53.519	189.368		19.67	0.000	0.000
						C	18.702	209.865		20.91	0.000	0.000
T10 20.00-0.00	10.00	1	14	0.5000	405.448	A	35.792	158.376	47.910	24.67	0.000	0.000
						B	47.543	144.830		24.90	0.000	0.000
						C	24.985	156.035		26.47	0.000	0.000

**Tower Pressure - Service**

$G_H = 1.125$

Section Elevation	z	$K_z$	$q_z$	$A_G$	F a c e	$A_F$	$A_R$	$A_{leg}$	Leg %	$C_{AA}$ In Face	$C_{AA}$ Out Face
ft	ft		psf	ft <sup>2</sup>		ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>		ft <sup>2</sup>	ft <sup>2</sup>
T1 170.00-150.00	160.00	1.57	10	102.917	A	0.000	45.634	5.833	12.78	0.000	0.000
					B	0.000	51.117		11.41	0.000	0.000
					C	0.000	20.129		28.98	0.000	0.000
T2 150.00-140.00	145.00	1.526	10	66.055	A	5.476	31.109	11.905	32.54	0.000	0.000
					B	4.373	39.159		27.35	0.000	0.000
					C	5.258	15.705		56.79	0.000	0.000
T3 140.00-120.00	130.00	1.48	9	162.111	A	10.467	66.306	23.165	30.17	0.000	0.000
					B	7.886	99.564		21.56	0.000	0.000
					C	9.650	43.661		43.45	0.000	0.000



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 18 of 42
	<b>Project</b> VZ5-133 (Rev. 2)	<b>Date</b> 09:59:18 05/20/13
	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

Section Elevation	z	K <sub>Z</sub>	q <sub>z</sub>	A <sub>G</sub>	F <sub>a</sub>	A <sub>F</sub>	A <sub>R</sub>	A <sub>leg</sub>	Leg %	C <sub>A</sub> A <sub>i</sub> In Face	C <sub>A</sub> A <sub>i</sub> Out Face
ft	ft		psf	ft <sup>2</sup>	c	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>		ft <sup>2</sup>	ft <sup>2</sup>
T4 120.00-100.00	110.00	1.411	9	202.528	A	13.964	97.407	24.703	22.18	0.000	0.000
					B	11.023	124.907		18.17	0.000	0.000
					C	11.566	112.512		19.91	0.000	0.000
T5 100.00-90.00	95.00	1.353	9	116.264	A	6.561	70.875	12.351	15.95	0.000	0.000
					B	5.399	62.454		18.20	0.000	0.000
					C	5.570	79.053		14.60	0.000	0.000
T6 90.00-80.00	85.00	1.31	8	126.517	A	6.959	74.641	13.283	16.28	0.000	0.000
					B	5.844	66.219		18.43	0.000	0.000
					C	6.008	79.985		15.45	0.000	0.000
T7 80.00-60.00	70.00	1.24	8	282.945	A	15.144	153.290	26.241	15.58	0.000	0.000
					B	13.019	136.446		17.56	0.000	0.000
					C	13.333	159.645		15.17	0.000	0.000
T8 60.00-40.00	50.00	1.126	7	323.362	A	19.635	155.358	28.309	16.18	0.000	0.000
					B	17.274	138.514		18.17	0.000	0.000
					C	17.622	161.713		15.79	0.000	0.000
T9 40.00-20.00	30.00	1	6	363.756	A	21.661	158.305	29.807	16.56	0.000	0.000
					B	19.382	141.462		18.53	0.000	0.000
					C	19.718	163.211		16.29	0.000	0.000
T10 20.00-0.00	10.00	1	6	403.780	A	27.125	114.363	29.897	21.13	0.000	0.000
					B	25.476	103.415		23.20	0.000	0.000
					C	25.719	116.609		21.01	0.000	0.000

### Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F <sub>a</sub>	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K	c						ft <sup>2</sup>	K	plf	
T1 170.00-150.00	0.29	1.16	A	0.443	1.984	0.67	1	1	30.587	2.21	110.61	B
			B	0.497	1.904	0.696	1	1	35.568			
			C	0.196	2.611	0.59	1	1	11.866			
T2 150.00-140.00	0.19	1.12	A	0.554	1.84	0.726	1	1	28.074	2.00	199.82	B
			B	0.659	1.779	0.791	1	1	35.367			
			C	0.317	2.251	0.621	1	1	15.017			
T3 140.00-120.00	0.54	2.09	A	0.474	1.937	0.684	1	1	55.846	4.76	237.96	B
			B	0.663	1.778	0.794	1	1	86.945			
			C	0.329	2.222	0.625	1	1	36.944			
T4 120.00-100.00	1.07	2.60	A	0.55	1.844	0.724	1	1	84.508	5.78	289.20	B
			B	0.671	1.777	0.8	1	1	110.915			
			C	0.613	1.797	0.761	1	1	97.235			
T5 100.00-90.00	0.69	1.48	A	0.666	1.778	0.796	1	1	62.995	3.61	360.66	C
			B	0.584	1.815	0.744	1	1	51.846			
			C	0.728	1.78	0.84	1	1	71.990			
T6 90.00-80.00	0.70	1.76	A	0.645	1.783	0.782	1	1	65.340	3.41	341.09	C
			B	0.57	1.826	0.735	1	1	54.545			
			C	0.68	1.776	0.806	1	1	70.445			
T7 80.00-60.00	1.41	3.52	A	0.595	1.807	0.751	1	1	130.223	6.25	312.33	C
			B	0.528	1.866	0.712	1	1	110.211			
			C	0.611	1.797	0.761	1	1	134.760			
T8 60.00-40.00	1.41	4.45	A	0.541	1.852	0.719	1	1	131.393	5.82	291.17	C
			B	0.482	1.925	0.688	1	1	112.623			
			C	0.555	1.839	0.727	1	1	135.165			
T9 40.00-20.00	1.42	5.11	A	0.495	1.907	0.695	1	1	131.657	5.28	263.91	C
			B	0.442	1.987	0.67	1	1	114.121			
			C	0.503	1.896	0.699	1	1	133.798			
T10 20.00-0.00	0.93	5.16	A	0.35	2.171	0.633	1	1	99.474	4.49	224.58	A
			B	0.319	2.246	0.622	1	1	89.797			



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 19 of 42
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	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
Sum Weight:	8.67	28.44	C	0.352	2.166	0.633	1	1	99.576 3462.85 kip-ft	43.61		

### Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T1 170.00-150.00	0.29	1.16	A	0.443	1.984	0.67	0.825	1	30.587	2.21	110.61	B
			B	0.497	1.904	0.696	0.825	1	35.568			
			C	0.196	2.611	0.59	0.825	1	11.866			
T2 150.00-140.00	0.19	1.12	A	0.554	1.84	0.726	0.825	1	27.116	1.95	195.49	B
			B	0.659	1.779	0.791	0.825	1	34.602			
			C	0.317	2.251	0.621	0.825	1	14.097			
T3 140.00-120.00	0.54	2.09	A	0.474	1.937	0.684	0.825	1	54.014	4.68	234.19	B
			B	0.663	1.778	0.794	0.825	1	85.565			
			C	0.329	2.222	0.625	0.825	1	35.256			
T4 120.00-100.00	1.07	2.60	A	0.55	1.844	0.724	0.825	1	82.065	5.68	284.17	B
			B	0.671	1.777	0.8	0.825	1	108.986			
			C	0.613	1.797	0.761	0.825	1	95.211			
T5 100.00-90.00	0.69	1.48	A	0.666	1.778	0.796	0.825	1	61.847	3.56	355.77	C
			B	0.584	1.815	0.744	0.825	1	50.901			
			C	0.728	1.78	0.84	0.825	1	71.015			
T6 90.00-80.00	0.70	1.76	A	0.645	1.783	0.782	0.825	1	64.122	3.36	336.00	C
			B	0.57	1.826	0.735	0.825	1	53.522			
			C	0.68	1.776	0.806	0.825	1	69.394			
T7 80.00-60.00	1.41	3.52	A	0.595	1.807	0.751	0.825	1	127.573	6.14	306.92	C
			B	0.528	1.866	0.712	0.825	1	107.933			
			C	0.611	1.797	0.761	0.825	1	132.427			
T8 60.00-40.00	1.41	4.45	A	0.541	1.852	0.719	0.825	1	127.957	5.69	284.52	C
			B	0.482	1.925	0.688	0.825	1	109.600			
			C	0.555	1.839	0.727	0.825	1	132.081			
T9 40.00-20.00	1.42	5.11	A	0.495	1.907	0.695	0.825	1	127.866	5.14	257.10	C
			B	0.442	1.987	0.67	0.825	1	110.729			
			C	0.503	1.896	0.699	0.825	1	130.348			
T10 20.00-0.00	0.93	5.16	A	0.35	2.171	0.633	0.825	1	94.727	4.28	214.18	C
			B	0.319	2.246	0.622	0.825	1	85.339			
			C	0.352	2.166	0.633	0.825	1	95.075			
Sum Weight:	8.67	28.44						OTM	3406.35 kip-ft	42.71		

### Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T1 170.00-150.00	0.29	1.16	A	0.443	1.984	0.67	0.8	1	30.587	2.21	110.61	B
			B	0.497	1.904	0.696	0.8	1	35.568			



<b>inxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 20 of 42
	<b>Project</b> VZ5-133 (Rev. 2)	<b>Date</b> 09:59:18 05/20/13
	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T2 150.00-140.00	0.19	1.12	C	0.196	2.611	0.59	0.8	1	11.866			
			A	0.554	1.84	0.726	0.8	1	26.979	1.95	194.88	B
			B	0.659	1.779	0.791	0.8	1	34.492			
T3 140.00-120.00	0.54	2.09	C	0.317	2.251	0.621	0.8	1	13.965			
			A	0.474	1.937	0.684	0.8	1	53.752	4.67	233.65	B
			B	0.663	1.778	0.794	0.8	1	85.368			
T4 120.00-100.00	1.07	2.60	C	0.329	2.222	0.625	0.8	1	35.015			
			A	0.55	1.844	0.724	0.8	1	81.715	5.67	283.45	B
			B	0.671	1.777	0.8	0.8	1	108.711			
T5 100.00-90.00	0.69	1.48	C	0.613	1.797	0.761	0.8	1	94.922			
			A	0.666	1.778	0.796	0.8	1	61.683	3.55	355.08	C
			B	0.584	1.815	0.744	0.8	1	50.766			
T6 90.00-80.00	0.70	1.76	C	0.728	1.78	0.84	0.8	1	70.876			
			A	0.645	1.783	0.782	0.8	1	63.948	3.35	335.27	C
			B	0.57	1.826	0.735	0.8	1	53.376			
T7 80.00-60.00	1.41	3.52	C	0.68	1.776	0.806	0.8	1	69.244			
			A	0.595	1.807	0.751	0.8	1	127.194	6.12	306.15	C
			B	0.528	1.866	0.712	0.8	1	107.607			
T8 60.00-40.00	1.41	4.45	C	0.611	1.797	0.761	0.8	1	132.093			
			A	0.541	1.852	0.719	0.8	1	127.466	5.67	283.57	C
			B	0.482	1.925	0.688	0.8	1	109.168			
T9 40.00-20.00	1.42	5.11	C	0.555	1.839	0.727	0.8	1	131.641			
			A	0.495	1.907	0.695	0.8	1	127.325	5.12	256.13	C
			B	0.442	1.987	0.67	0.8	1	110.244			
T10 20.00-0.00	0.93	5.16	C	0.503	1.896	0.699	0.8	1	129.855			
			A	0.35	2.171	0.633	0.8	1	94.049	4.25	212.73	C
			B	0.319	2.246	0.622	0.8	1	84.702			
Sum Weight:	8.67	28.44	C	0.352	2.166	0.633	0.8	1	94.432			
							OTM		3398.29 kip-ft	42.58		

### Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T1 170.00-150.00	0.29	1.16	A	0.443	1.984	0.67	0.85	1	30.587	2.21	110.61	B
			B	0.497	1.904	0.696	0.85	1	35.568			
			C	0.196	2.611	0.59	0.85	1	11.866			
T2 150.00-140.00	0.19	1.12	A	0.554	1.84	0.726	0.85	1	27.253	1.96	196.11	B
			B	0.659	1.779	0.791	0.85	1	34.711			
			C	0.317	2.251	0.621	0.85	1	14.228			
T3 140.00-120.00	0.54	2.09	A	0.474	1.937	0.684	0.85	1	54.276	4.69	234.73	B
			B	0.663	1.778	0.794	0.85	1	85.762			
			C	0.329	2.222	0.625	0.85	1	35.497			
T4 120.00-100.00	1.07	2.60	A	0.55	1.844	0.724	0.85	1	82.414	5.70	284.89	B
			B	0.671	1.777	0.8	0.85	1	109.262			
			C	0.613	1.797	0.761	0.85	1	95.500			
T5 100.00-90.00	0.69	1.48	A	0.666	1.778	0.796	0.85	1	62.011	3.56	356.47	C
			B	0.584	1.815	0.744	0.85	1	51.036			
			C	0.728	1.78	0.84	0.85	1	71.154			
T6 90.00-80.00	0.70	1.76	A	0.645	1.783	0.782	0.85	1	64.296	3.37	336.73	C
			B	0.57	1.826	0.735	0.85	1	53.669			
			C	0.68	1.776	0.806	0.85	1	69.544			
T7	1.41	3.52	A	0.595	1.807	0.751	0.85	1	127.951	6.15	307.69	C



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PIROD U20'-0"x170' Lattice Tower	<b>Page</b> 21 of 42
	<b>Project</b> VZ5-133 (Rev. 2)	<b>Date</b> 09:59:18 05/20/13
	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
80.00-60.00			B	0.528	1.866	0.712	0.85	1	108.258			
			C	0.611	1.797	0.761	0.85	1	132.760			
T8	1.41	4.45	A	0.541	1.852	0.719	0.85	1	128.448	5.71	285.47	C
60.00-40.00			B	0.482	1.925	0.688	0.85	1	110.032			
			C	0.555	1.839	0.727	0.85	1	132.522			
T9	1.42	5.11	A	0.495	1.907	0.695	0.85	1	128.408	5.16	258.07	C
40.00-20.00			B	0.442	1.987	0.67	0.85	1	111.213			
			C	0.503	1.896	0.699	0.85	1	130.841			
T10	0.93	5.16	A	0.35	2.171	0.633	0.85	1	95.405	4.31	215.62	C
20.00-0.00			B	0.319	2.246	0.622	0.85	1	85.976			
			C	0.352	2.166	0.633	0.85	1	95.718			
Sum Weight:	8.67	28.44						OTM	3414.42 kip-ft	42.83		

### Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T1	0.76	1.49	A	0.708	1.777	0.826	1	1	61.139	3.02	151.23	B
170.00-150.00			B	0.761	1.792	0.865	1	1	68.891			
			C	0.356	2.159	0.634	1	1	23.598			
T2	0.50	1.64	A	0.852	1.864	0.94	1	1	53.908	3.19*	318.60	B
150.00-140.00			B	0.988	2.075	1	1	1	66.074			
			C	0.511	1.886	0.703	1	1	25.552			
T3	1.51	3.77	A	0.745	1.786	0.853	1	1	105.587	7.56*	378.07	B
140.00-120.00			B	1	2.1	1	1	1	166.770			
			C	0.497	1.903	0.696	1	1	59.472			
T4	2.81	4.44	A	0.781	1.803	0.881	1	1	142.115	8.99*	449.40	B
120.00-100.00			B	0.988	2.075	1	1	1	201.720			
			C	0.8	1.816	0.896	1	1	147.356			
T5	1.79	2.39	A	0.874	1.889	0.959	1	1	98.447	4.22	422.28	C
100.00-90.00			B	0.863	1.876	0.949	1	1	96.706			
			C	0.901	1.926	0.984	1	1	103.912			
T6	1.83	2.70	A	0.862	1.875	0.949	1	1	104.653	4.01	401.08	A
90.00-80.00			B	0.852	1.864	0.94	1	1	103.249			
			C	0.843	1.854	0.932	1	1	100.424			
T7	3.74	5.43	A	0.806	1.82	0.901	1	1	209.469	7.38	368.76	A
80.00-60.00			B	0.798	1.815	0.895	1	1	208.238			
			C	0.759	1.791	0.864	1	1	188.314			
T8	3.74	6.58	A	0.73	1.781	0.842	1	1	204.980	6.41	320.67	A
60.00-40.00			B	0.722	1.779	0.836	1	1	204.702			
			C	0.688	1.776	0.812	1	1	184.729			
T9	3.77	7.34	A	0.671	1.777	0.8	1	1	203.117	5.66	283.15	B
40.00-20.00			B	0.665	1.778	0.795	1	1	204.125			
			C	0.625	1.79	0.77	1	1	180.199			
T10	2.47	7.56	A	0.479	1.929	0.687	1	1	144.591	4.43	221.53	B
20.00-0.00			B	0.474	1.935	0.685	1	1	146.724			
			C	0.446	1.979	0.672	1	1	129.788			
Sum Weight:	22.91	43.35				2A <sub>g</sub> limit		OTM	4710.78 kip-ft	54.88		



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 22 of 42
	<b>Project</b> VZ5-133 (Rev. 2)	<b>Date</b> 09:59:18 05/20/13
	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

### Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> ft <sup>2</sup>	F K	w plf	Ctrl. Face
T1 170.00-150.00	0.76	1.49	A	0.708	1.777	0.826	0.825	1	61.139	3.02	151.23	B
			B	0.761	1.792	0.865	0.825	1	68.891			
			C	0.356	2.159	0.634	0.825	1	23.598			
T2 150.00-140.00	0.50	1.64	A	0.852	1.864	0.94	0.825	1	52.949	3.19'	318.60	B
			B	0.988	2.075	1	0.825	1	65.406			
			C	0.511	1.886	0.703	0.825	1	24.665			
T3 140.00-120.00	1.51	3.77	A	0.745	1.786	0.853	0.825	1	103.756	7.56'	378.07	B
			B	1	2.1	1	0.825	1	162.947			
			C	0.497	1.903	0.696	0.825	1	57.877			
T4 120.00-100.00	2.81	4.44	A	0.781	1.803	0.881	0.825	1	139.671	8.96	448.08	B
			B	0.988	2.075	1	0.825	1	196.235			
			C	0.8	1.816	0.896	0.825	1	145.555			
T5 100.00-90.00	1.79	2.39	A	0.874	1.889	0.959	0.825	1	97.299	4.19	418.69	C
			B	0.863	1.876	0.949	0.825	1	93.944			
			C	0.901	1.926	0.984	0.825	1	103.028			
T6 90.00-80.00	1.83	2.70	A	0.862	1.875	0.949	0.825	1	102.735	3.94	393.73	A
			B	0.852	1.864	0.94	0.825	1	99.703			
			C	0.843	1.854	0.932	0.825	1	99.460			
T7 80.00-60.00	3.74	5.43	A	0.806	1.82	0.901	0.825	1	204.485	7.20	359.99	A
			B	0.798	1.815	0.895	0.825	1	199.966			
			C	0.759	1.791	0.864	0.825	1	186.146			
T8 60.00-40.00	3.74	6.58	A	0.73	1.781	0.842	0.825	1	199.210	6.23	311.65	A
			B	0.722	1.779	0.836	0.825	1	195.716			
			C	0.688	1.776	0.812	0.825	1	181.829			
T9 40.00-20.00	3.77	7.34	A	0.671	1.777	0.8	0.825	1	196.994	5.46	273.10	A
			B	0.665	1.778	0.795	0.825	1	194.759			
			C	0.625	1.79	0.77	0.825	1	176.926			
T10 20.00-0.00	2.47	7.56	A	0.479	1.929	0.687	0.825	1	138.327	4.18	208.97	B
			B	0.474	1.935	0.685	0.825	1	138.404			
			C	0.446	1.979	0.672	0.825	1	125.415			
Sum Weight:	22.91	43.35			*2A <sub>g</sub> limit			OTM	4668.36 kip-ft	53.93		

### Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> ft <sup>2</sup>	F K	w plf	Ctrl. Face
T1 170.00-150.00	0.76	1.49	A	0.708	1.777	0.826	0.8	1	61.139	3.02	151.23	B
			B	0.761	1.792	0.865	0.8	1	68.891			
			C	0.356	2.159	0.634	0.8	1	23.598			
T2 150.00-140.00	0.50	1.64	A	0.852	1.864	0.94	0.8	1	52.813	3.19'	318.60	B
			B	0.988	2.075	1	0.8	1	65.310			
			C	0.511	1.886	0.703	0.8	1	24.538			
T3 140.00-120.00	1.51	3.77	A	0.745	1.786	0.853	0.8	1	103.494	7.56'	378.07	B
			B	1	2.1	1	0.8	1	162.401			
			C	0.497	1.903	0.696	0.8	1	57.649			
T4 120.00-100.00	2.81	4.44	A	0.781	1.803	0.881	0.8	1	139.322	8.93	446.29	B
			B	0.988	2.075	1	0.8	1	195.451			
			C	0.8	1.816	0.896	0.8	1	145.298			
T5 100.00-90.00	1.79	2.39	A	0.874	1.889	0.959	0.8	1	97.135	4.18	418.17	C
			B	0.863	1.876	0.949	0.8	1	93.549			



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 23 of 42
	<b>Project</b> VZ5-133 (Rev. 2)	<b>Date</b> 09:59:18 05/20/13
	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> ft <sup>2</sup>	F K	w plf	Ctrl. Face
T6 90.00-80.00	1.83	2.70	C	0.901	1.926	0.984	0.8	1	102.902	3.93	392.68	A
			A	0.862	1.875	0.949	0.8	1	102.461			
			B	0.852	1.864	0.94	0.8	1	99.197			
T7 80.00-60.00	3.74	5.43	C	0.843	1.854	0.932	0.8	1	99.322	7.17	358.74	A
			A	0.806	1.82	0.901	0.8	1	203.773			
			B	0.798	1.815	0.895	0.8	1	198.785			
T8 60.00-40.00	3.74	6.58	C	0.759	1.791	0.864	0.8	1	185.837	6.21	310.36	A
			A	0.73	1.781	0.842	0.8	1	198.386			
			B	0.722	1.779	0.836	0.8	1	194.432			
T9 40.00-20.00	3.77	7.34	C	0.688	1.776	0.812	0.8	1	181.415	5.44	271.89	A
			A	0.671	1.777	0.8	0.8	1	196.119			
			B	0.665	1.778	0.795	0.8	1	193.421			
T10 20.00-0.00	2.47	7.56	C	0.625	1.79	0.77	0.8	1	176.458	4.14	207.17	B
			A	0.479	1.929	0.687	0.8	1	137.432			
			B	0.474	1.935	0.685	0.8	1	137.215			
Sum Weight:	22.91	43.35			*A <sub>g</sub> limit			OTM	4658.92 kip-ft	53.77		

### Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub> ft <sup>2</sup>	F K	w plf	Ctrl. Face
T1 170.00-150.00	0.76	1.49	A	0.708	1.777	0.826	0.85	1	61.139	3.02	151.23	B
			B	0.761	1.792	0.865	0.85	1	68.891			
			C	0.356	2.159	0.634	0.85	1	23.598			
T2 150.00-140.00	0.50	1.64	A	0.852	1.864	0.94	0.85	1	53.086	3.19'	318.60	B
			B	0.988	2.075	1	0.85	1	65.501			
			C	0.511	1.886	0.703	0.85	1	24.792			
T3 140.00-120.00	1.51	3.77	A	0.745	1.786	0.853	0.85	1	104.017	7.56'	378.07	B
			B	1	2.1	1	0.85	1	163.493			
			C	0.497	1.903	0.696	0.85	1	58.105			
T4 120.00-100.00	2.81	4.44	A	0.781	1.803	0.881	0.85	1	140.020	8.99'	449.40	B
			B	0.988	2.075	1	0.85	1	197.019			
			C	0.8	1.816	0.896	0.85	1	145.812			
T5 100.00-90.00	1.79	2.39	A	0.874	1.889	0.959	0.85	1	97.463	4.19	419.20	C
			B	0.863	1.876	0.949	0.85	1	94.338			
			C	0.901	1.926	0.984	0.85	1	103.154			
T6 90.00-80.00	1.83	2.70	A	0.862	1.875	0.949	0.85	1	103.009	3.95	394.78	A
			B	0.852	1.864	0.94	0.85	1	100.210			
			C	0.843	1.854	0.932	0.85	1	99.598			
T7 80.00-60.00	3.74	5.43	A	0.806	1.82	0.901	0.85	1	205.197	7.22	361.24	A
			B	0.798	1.815	0.895	0.85	1	201.148			
			C	0.759	1.791	0.864	0.85	1	186.456			
T8 60.00-40.00	3.74	6.58	A	0.73	1.781	0.842	0.85	1	200.035	6.26	312.94	A
			B	0.722	1.779	0.836	0.85	1	197.000			
			C	0.688	1.776	0.812	0.85	1	182.243			
T9 40.00-20.00	3.77	7.34	A	0.671	1.777	0.8	0.85	1	197.868	5.49	274.31	A
			B	0.665	1.778	0.795	0.85	1	196.097			
			C	0.625	1.79	0.77	0.85	1	177.393			
T10 20.00-0.00	2.47	7.56	A	0.479	1.929	0.687	0.85	1	139.222	4.22	210.76	B
			B	0.474	1.935	0.685	0.85	1	139.593			
			C	0.446	1.979	0.672	0.85	1	126.040			



<b>inxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 24 of 42
	<b>Project</b> VZ5-133 (Rev. 2)	<b>Date</b> 09:59:18 05/20/13
	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
Sum Weight:	22.91	43.35			*2A <sub>g</sub> limit			OTM	4676.78 kip-ft	54.08		

### Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T1 170.00-150.00	0.29	1.16	A	0.443	1.984	0.67	1	1	30.587	0.77	38.27	B
			B	0.497	1.904	0.696	1	1	35.568			
			C	0.196	2.611	0.59	1	1	11.866			
T2 150.00-140.00	0.19	1.12	A	0.554	1.84	0.726	1	1	28.074	0.69	69.14	B
			B	0.659	1.779	0.791	1	1	35.367			
			C	0.317	2.251	0.621	1	1	15.017			
T3 140.00-120.00	0.54	2.09	A	0.474	1.937	0.684	1	1	55.846	1.65	82.34	B
			B	0.663	1.778	0.794	1	1	86.945			
			C	0.329	2.222	0.625	1	1	36.944			
T4 120.00-100.00	1.07	2.60	A	0.55	1.844	0.724	1	1	84.508	2.00	100.07	B
			B	0.671	1.777	0.8	1	1	110.915			
			C	0.613	1.797	0.761	1	1	97.235			
T5 100.00-90.00	0.69	1.48	A	0.666	1.778	0.796	1	1	62.995	1.25	124.79	C
			B	0.584	1.815	0.744	1	1	51.846			
			C	0.728	1.78	0.84	1	1	71.990			
T6 90.00-80.00	0.70	1.76	A	0.645	1.783	0.782	1	1	65.340	1.18	118.02	C
			B	0.57	1.826	0.735	1	1	54.545			
			C	0.68	1.776	0.806	1	1	70.445			
T7 80.00-60.00	1.41	3.52	A	0.595	1.807	0.751	1	1	130.223	2.16	108.07	C
			B	0.528	1.866	0.712	1	1	110.211			
			C	0.611	1.797	0.761	1	1	134.760			
T8 60.00-40.00	1.41	4.45	A	0.541	1.852	0.719	1	1	131.393	2.01	100.75	C
			B	0.482	1.925	0.688	1	1	112.623			
			C	0.555	1.839	0.727	1	1	135.165			
T9 40.00-20.00	1.42	5.11	A	0.495	1.907	0.695	1	1	131.657	1.83	91.32	C
			B	0.442	1.987	0.67	1	1	114.121			
			C	0.503	1.896	0.699	1	1	133.798			
T10 20.00-0.00	0.93	5.16	A	0.35	2.171	0.633	1	1	99.474	1.55	77.71	A
			B	0.319	2.246	0.622	1	1	89.797			
			C	0.352	2.166	0.633	1	1	99.576			
Sum Weight:	8.67	28.44						OTM	1198.22 kip-ft	15.09		

### Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T1 170.00-150.00	0.29	1.16	A	0.443	1.984	0.67	0.825	1	30.587	0.77	38.27	B
			B	0.497	1.904	0.696	0.825	1	35.568			
			C	0.196	2.611	0.59	0.825	1	11.866			



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 25 of 42
	<b>Project</b> VZ5-133 (Rev. 2)	<b>Date</b> 09:59:18 05/20/13
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Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T2 150.00-140.00	0.19	1.12	A	0.554	1.84	0.726	0.825	1	27.116	0.68	67.64	B
			B	0.659	1.779	0.791	0.825	1	34.602			
			C	0.317	2.251	0.621	0.825	1	14.097			
T3 140.00-120.00	0.54	2.09	A	0.474	1.937	0.684	0.825	1	54.014	1.62	81.03	B
			B	0.663	1.778	0.794	0.825	1	85.565			
			C	0.329	2.222	0.625	0.825	1	35.256			
T4 120.00-100.00	1.07	2.60	A	0.55	1.844	0.724	0.825	1	82.065	1.97	98.33	B
			B	0.671	1.777	0.8	0.825	1	108.986			
			C	0.613	1.797	0.761	0.825	1	95.211			
T5 100.00-90.00	0.69	1.48	A	0.666	1.778	0.796	0.825	1	61.847	1.23	123.10	C
			B	0.584	1.815	0.744	0.825	1	50.901			
			C	0.728	1.78	0.84	0.825	1	71.015			
T6 90.00-80.00	0.70	1.76	A	0.645	1.783	0.782	0.825	1	64.122	1.16	116.26	C
			B	0.57	1.826	0.735	0.825	1	53.522			
			C	0.68	1.776	0.806	0.825	1	69.394			
T7 80.00-60.00	1.41	3.52	A	0.595	1.807	0.751	0.825	1	127.573	2.12	106.20	C
			B	0.528	1.866	0.712	0.825	1	107.933			
			C	0.611	1.797	0.761	0.825	1	132.427			
T8 60.00-40.00	1.41	4.45	A	0.541	1.852	0.719	0.825	1	127.957	1.97	98.45	C
			B	0.482	1.925	0.688	0.825	1	109.600			
			C	0.555	1.839	0.727	0.825	1	132.081			
T9 40.00-20.00	1.42	5.11	A	0.495	1.907	0.695	0.825	1	127.866	1.78	88.96	C
			B	0.442	1.987	0.67	0.825	1	110.729			
			C	0.503	1.896	0.699	0.825	1	130.348			
T10 20.00-0.00	0.93	5.16	A	0.35	2.171	0.633	0.825	1	94.727	1.48	74.11	C
			B	0.319	2.246	0.622	0.825	1	85.339			
			C	0.352	2.166	0.633	0.825	1	95.075			
Sum Weight:	8.67	28.44						OTM	1178.67 kip-ft	14.78		

### Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T1 170.00-150.00	0.29	1.16	A	0.443	1.984	0.67	0.8	1	30.587	0.77	38.27	B
			B	0.497	1.904	0.696	0.8	1	35.568			
			C	0.196	2.611	0.59	0.8	1	11.866			
T2 150.00-140.00	0.19	1.12	A	0.554	1.84	0.726	0.8	1	26.979	0.67	67.43	B
			B	0.659	1.779	0.791	0.8	1	34.492			
			C	0.317	2.251	0.621	0.8	1	13.965			
T3 140.00-120.00	0.54	2.09	A	0.474	1.937	0.684	0.8	1	53.752	1.62	80.85	B
			B	0.663	1.778	0.794	0.8	1	85.368			
			C	0.329	2.222	0.625	0.8	1	35.015			
T4 120.00-100.00	1.07	2.60	A	0.55	1.844	0.724	0.8	1	81.715	1.96	98.08	B
			B	0.671	1.777	0.8	0.8	1	108.711			
			C	0.613	1.797	0.761	0.8	1	94.922			
T5 100.00-90.00	0.69	1.48	A	0.666	1.778	0.796	0.8	1	61.683	1.23	122.86	C
			B	0.584	1.815	0.744	0.8	1	50.766			
			C	0.728	1.78	0.84	0.8	1	70.876			
T6 90.00-80.00	0.70	1.76	A	0.645	1.783	0.782	0.8	1	63.948	1.16	116.01	C
			B	0.57	1.826	0.735	0.8	1	53.376			
			C	0.68	1.776	0.806	0.8	1	69.244			
T7 80.00-60.00	1.41	3.52	A	0.595	1.807	0.751	0.8	1	127.194	2.12	105.93	C
			B	0.528	1.866	0.712	0.8	1	107.607			



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 26 of 42
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	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T8 60.00-40.00	1.41	4.45	C	0.611	1.797	0.761	0.8	1	132.093	1.96	98.12	C
			A	0.541	1.852	0.719	0.8	1	127.466			
			B	0.482	1.925	0.688	0.8	1	109.168			
T9 40.00-20.00	1.42	5.11	C	0.555	1.839	0.727	0.8	1	131.641	1.77	88.63	C
			A	0.495	1.907	0.695	0.8	1	127.325			
			B	0.442	1.987	0.67	0.8	1	110.244			
T10 20.00-0.00	0.93	5.16	C	0.503	1.896	0.699	0.8	1	129.855	1.47	73.61	C
			A	0.35	2.171	0.633	0.8	1	94.049			
			B	0.319	2.246	0.622	0.8	1	84.702			
Sum Weight:	8.67	28.44	C	0.352	2.166	0.633	0.8	1	94.432	14.73		
								OTM	1175.88 kip-ft			

### Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C <sub>F</sub>	R <sub>R</sub>	D <sub>F</sub>	D <sub>R</sub>	A <sub>E</sub>	F	w	Ctrl. Face
ft	K	K							ft <sup>2</sup>	K	plf	
T1 170.00-150.00	0.29	1.16	A	0.443	1.984	0.67	0.85	1	30.587	0.77	38.27	B
			B	0.497	1.904	0.696	0.85	1	35.568			
			C	0.196	2.611	0.59	0.85	1	11.866			
T2 150.00-140.00	0.19	1.12	A	0.554	1.84	0.726	0.85	1	27.253	0.68	67.86	B
			B	0.659	1.779	0.791	0.85	1	34.711			
			C	0.317	2.251	0.621	0.85	1	14.228			
T3 140.00-120.00	0.54	2.09	A	0.474	1.937	0.684	0.85	1	54.276	1.62	81.22	B
			B	0.663	1.778	0.794	0.85	1	85.762			
			C	0.329	2.222	0.625	0.85	1	35.497			
T4 120.00-100.00	1.07	2.60	A	0.55	1.844	0.724	0.85	1	82.414	1.97	98.58	B
			B	0.671	1.777	0.8	0.85	1	109.262			
			C	0.613	1.797	0.761	0.85	1	95.500			
T5 100.00-90.00	0.69	1.48	A	0.666	1.778	0.796	0.85	1	62.011	1.23	123.35	C
			B	0.584	1.815	0.744	0.85	1	51.036			
			C	0.728	1.78	0.84	0.85	1	71.154			
T6 90.00-80.00	0.70	1.76	A	0.645	1.783	0.782	0.85	1	64.296	1.17	116.51	C
			B	0.57	1.826	0.735	0.85	1	53.669			
			C	0.68	1.776	0.806	0.85	1	69.544			
T7 80.00-60.00	1.41	3.52	A	0.595	1.807	0.751	0.85	1	127.951	2.13	106.47	C
			B	0.528	1.866	0.712	0.85	1	108.258			
			C	0.611	1.797	0.761	0.85	1	132.760			
T8 60.00-40.00	1.41	4.45	A	0.541	1.852	0.719	0.85	1	128.448	1.98	98.78	C
			B	0.482	1.925	0.688	0.85	1	110.032			
			C	0.555	1.839	0.727	0.85	1	132.522			
T9 40.00-20.00	1.42	5.11	A	0.495	1.907	0.695	0.85	1	128.408	1.79	89.30	C
			B	0.442	1.987	0.67	0.85	1	111.213			
			C	0.503	1.896	0.699	0.85	1	130.841			
T10 20.00-0.00	0.93	5.16	A	0.35	2.171	0.633	0.85	1	95.405	1.49	74.61	C
			B	0.319	2.246	0.622	0.85	1	85.976			
			C	0.352	2.166	0.633	0.85	1	95.718			
Sum Weight:	8.67	28.44						OTM	1181.46 kip-ft	14.82		



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 27 of 42
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	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

### Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, $M_x$ kip-ft	Sum of Overturning Moments, $M_z$ kip-ft	Sum of Torques kip-ft
Leg Weight	18.66					
Bracing Weight	9.78					
Total Member Self-Weight	28.44			3.84	-0.49	
Total Weight	48.53			3.84	-0.49	
Wind 0 deg - No Ice		-0.02	-58.34	-5417.91	0.50	-1.14
Wind 30 deg - No Ice		28.71	-49.80	-4644.34	-2680.21	0.48
Wind 45 deg - No Ice		40.77	-40.46	-3773.55	-3820.23	1.87
Wind 60 deg - No Ice		49.89	-28.48	-2653.83	-4681.10	3.24
Wind 90 deg - No Ice		57.69	0.24	34.20	-5398.40	4.29
Wind 120 deg - No Ice		50.67	29.50	2746.88	-4722.63	4.21
Wind 135 deg - No Ice		40.81	40.80	3814.18	-3826.48	3.56
Wind 150 deg - No Ice		29.00	49.99	4669.62	-2721.14	3.28
Wind 180 deg - No Ice		0.21	57.57	5392.01	-27.21	3.39
Wind 210 deg - No Ice		-28.78	49.88	4656.59	2692.95	-0.26
Wind 225 deg - No Ice		-40.64	40.68	3799.50	3804.92	-1.29
Wind 240 deg - No Ice		-50.52	29.38	2734.01	4701.33	-1.71
Wind 270 deg - No Ice		-57.59	0.10	19.70	5383.08	-2.07
Wind 300 deg - No Ice		-49.79	-28.67	-2676.00	4665.08	-1.86
Wind 315 deg - No Ice		-40.70	-40.61	-3791.36	3807.21	-1.79
Wind 330 deg - No Ice		-28.75	-49.88	-4654.76	2682.29	-2.44
Member Ice	14.91					
Total Weight Ice	82.54			8.84	-4.66	
Wind 0 deg - Ice		-0.01	-68.98	-6582.46	-4.19	5.22
Wind 30 deg - Ice		34.04	-59.01	-5665.95	-3278.06	2.51
Wind 45 deg - Ice		48.24	-47.99	-4609.09	-4656.52	1.34
Wind 60 deg - Ice		59.00	-33.80	-3244.53	-5701.30	0.18
Wind 90 deg - Ice		68.29	0.19	32.88	-6581.94	-2.87
Wind 120 deg - Ice		59.86	34.75	3329.84	-5734.46	-5.20
Wind 135 deg - Ice		48.26	48.26	4652.49	-4661.25	-5.90
Wind 150 deg - Ice		34.27	59.16	5697.28	-3310.50	-5.81
Wind 180 deg - Ice		0.16	68.08	6573.02	-25.80	-3.34
Wind 210 deg - Ice		-34.10	59.08	5687.07	3279.81	-2.33
Wind 225 deg - Ice		-48.14	48.16	4641.09	4635.78	-0.88
Wind 240 deg - Ice		-59.74	34.66	3320.02	5709.06	1.07
Wind 270 deg - Ice		-68.21	0.09	21.87	6561.05	4.65
Wind 300 deg - Ice		-58.91	-33.95	-3261.79	5679.59	6.99
Wind 315 deg - Ice		-48.18	-48.11	-4622.98	4637.09	7.32
Wind 330 deg - Ice		-34.07	-59.08	-5674.03	3270.64	6.48
Total Weight	48.53			3.84	-0.49	
Wind 0 deg - Service		-0.01	-20.19	-1881.53	1.48	-0.40
Wind 30 deg - Service		9.93	-17.23	-1613.86	-926.10	0.17
Wind 45 deg - Service		14.11	-14.00	-1312.55	-1320.57	0.65
Wind 60 deg - Service		17.26	-9.85	-925.11	-1618.45	1.12
Wind 90 deg - Service		19.96	0.08	5.01	-1866.65	1.48
Wind 120 deg - Service		17.53	10.21	943.65	-1632.82	1.46
Wind 135 deg - Service		14.12	14.12	1312.96	-1322.73	1.23
Wind 150 deg - Service		10.04	17.30	1608.96	-940.26	1.13
Wind 180 deg - Service		0.07	19.92	1858.92	-8.10	1.17
Wind 210 deg - Service		-9.96	17.26	1604.45	933.13	-0.09
Wind 225 deg - Service		-14.06	14.08	1307.88	1317.89	-0.45
Wind 240 deg - Service		-17.48	10.17	939.20	1628.07	-0.59
Wind 270 deg - Service		-19.93	0.04	-0.01	1863.97	-0.72
Wind 300 deg - Service		-17.23	-9.92	-932.77	1615.53	-0.64
Wind 315 deg - Service		-14.08	-14.05	-1318.71	1318.68	-0.62
Wind 330 deg - Service		-9.95	-17.26	-1617.47	929.44	-0.84



<b><i>tnxTower</i></b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b> PiROD U20'-0"x170' Lattice Tower	<b>Page</b> 28 of 42
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	<b>Client</b> Verizon	<b>Designed by</b> Michael_Dalickas

## 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 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

## Maximum Member Forces



<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b>	PIROD U20'-0"x170' Lattice Tower	<b>Page</b>	29 of 42
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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		
T1	170 - 150	Leg	Max Tension	22	23.82	-0.03	0.03		
			Max. Compression	19	-28.98	0.01	0.37		
			Max. Mx	30	-28.36	0.31	-0.20		
			Max. My	19	-28.98	0.01	0.37		
			Max. Vy	30	-3.19	0.31	-0.20		
			Max. Vx	19	-3.69	0.01	0.37		
		Diagonal	Max Tension	26	2.94	0.00	0.00		
			Max. Compression	26	-2.99	0.00	0.00		
			Max. Mx	19	2.44	-0.00	0.00		
			Max. My	26	-1.95	-0.00	-0.00		
			Max. Vy	19	0.01	-0.00	0.00		
			Max. Vx	26	0.00	-0.00	-0.00		
		Top Girt	Max Tension	5	0.10	0.00	0.00		
			Max. Compression	7	-0.13	0.00	0.00		
			Max. Mx	18	-0.01	0.01	0.00		
			Max. My	31	0.01	0.00	-0.00		
			Max. Vy	18	-0.01	0.00	0.00		
		Bottom Girt	Max. Vx	31	0.00	0.00	0.00		
			Max Tension	5	0.13	0.00	0.00		
			Max. Compression	7	-0.13	0.00	0.00		
			Max. Mx	18	-0.00	0.01	0.00		
Max. My	31		-0.00	0.00	-0.00				
T2	150 - 140	Leg	Max. Vy	18	-0.01	0.00	0.00		
			Max. Vx	31	0.00	0.00	0.00		
			Max Tension	22	28.39	-0.34	0.01		
			Max. Compression	19	-34.11	2.39	0.20		
			Max. Mx	22	27.76	-2.86	0.17		
			Max. My	31	-3.75	-0.22	-3.19		
		Diagonal	Max. Vy	27	0.58	-2.82	-0.23		
			Max. Vx	31	0.74	-0.22	-3.19		
			Max Tension	32	4.49	0.00	0.00		
			Max. Compression	24	-4.99	0.00	0.00		
			Max. Mx	22	3.75	0.04	0.00		
			Max. My	33	-3.97	-0.01	-0.02		
		Top Girt	Max. Vy	22	0.01	0.04	0.00		
			Max. Vx	33	0.00	0.00	0.00		
			Max Tension	5	0.33	0.00	0.00		
			Max. Compression	7	-0.28	0.00	0.00		
			Max. Mx	22	0.32	-0.02	0.00		
		T3	140 - 120	Leg	Max. My	31	0.03	0.00	0.00
					Max. Vy	22	0.02	0.00	0.00
					Max. Vx	31	-0.00	0.00	0.00
					Max Tension	32	60.64	-3.13	-0.16
Max. Compression	19				-72.96	2.71	-0.05		
Max. Mx	32				59.61	-3.46	-0.07		
Diagonal	Max. My			23	-7.73	-0.34	5.02		
	Max. Vy			27	0.66	-3.10	-0.11		
	Max. Vx			31	0.72	0.05	-3.12		
	Max Tension			28	8.41	0.00	0.00		
	Max. Compression			29	-8.79	0.00	0.00		
	Max. Mx			19	5.93	0.10	0.00		
Top Girt	Max. My			22	-5.68	-0.02	0.02		
	Max. Vy			19	-0.03	0.10	0.00		
	Max. Vx			22	-0.00	0.00	0.00		
	Max Tension			22	106.53	-4.52	-0.02		
	Max. Compression			24	-124.88	3.71	0.07		
T4	120 - 100			Leg	Max. Mx	19	-97.43	5.38	-0.02
					Max. My	23	-10.19	-0.46	7.29
					Max. Vy	32	0.91	-4.57	-0.13
					Max. Vx	20	1.51	-0.46	-7.18
		Max Tension	22		11.07	0.00	0.00		
		Diagonal	Max. Compression	24	-124.88	3.71	0.07		
			Max. Mx	19	-97.43	5.38	-0.02		
			Max. My	23	-10.19	-0.46	7.29		
			Max. Vy	32	0.91	-4.57	-0.13		
			Max. Vx	20	1.51	-0.46	-7.18		

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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	
T5	100 - 90	Mid Girt	Max. Compression	25	-11.76	0.00	0.00	
			Max. Mx	22	9.60	0.09	0.00	
			Max. My	33	-10.56	-0.02	-0.03	
			Max. Vy	22	0.03	0.09	0.00	
			Max. Vx	33	0.01	0.00	0.00	
			Max Tension	22	2.95	0.00	0.00	
			Max. Compression	19	-2.28	0.00	0.00	
			Max. Mx	32	2.94	-0.07	0.00	
			Max. My	32	-1.01	0.00	0.00	
			Max. Vy	32	0.03	0.00	0.00	
		Max. Vx	32	0.00	0.00	0.00		
		Leg	Max Tension	22	133.71	-4.56	0.01	
			Max. Compression	24	-155.95	4.16	-0.01	
			Max. Mx	32	133.25	-4.57	-0.13	
			Max. My	23	-11.19	-0.46	7.29	
Max. Vy	32		-0.22	-4.57	-0.13			
Diagonal	Max. Vx	20	-0.52	-0.46	-7.18			
	Max Tension	26	12.88	0.00	0.00			
	Max. Compression	26	-13.20	0.00	0.00			
	Max. Mx	24	9.84	0.16	0.01			
	Max. My	24	0.38	0.09	0.01			
	Max. Vy	24	-0.05	0.16	0.01			
	Max. Vx	24	0.00	0.00	0.00			
	T6	90 - 80	Leg	Max Tension	22	161.90	-3.95	-0.05
				Max. Compression	24	-187.55	5.28	0.02
				Max. Mx	24	-187.55	5.28	0.02
Max. My				23	-13.03	0.05	3.62	
Max. Vy				27	0.37	-5.16	0.04	
Diagonal			Max. Vx	28	-0.24	0.08	3.61	
			Max Tension	26	12.75	0.00	0.00	
			Max. Compression	26	-13.00	0.00	0.00	
			Max. Mx	24	10.31	0.14	0.01	
			Max. My	24	-0.49	0.08	0.01	
T7	80 - 60	Leg	Max. Vy	24	-0.04	0.14	0.01	
			Max. Vx	24	0.00	0.00	0.00	
			Max Tension	22	213.01	-4.44	-0.05	
			Max. Compression	24	-245.49	5.78	0.02	
			Max. Mx	24	-245.49	5.78	0.02	
		Diagonal	Max. My	26	-13.48	-0.25	-5.98	
			Max. Vy	19	-0.28	5.75	-0.02	
			Max. Vx	20	0.36	-0.21	-5.97	
			Max Tension	26	13.06	0.00	0.00	
			Max. Compression	26	-13.56	0.00	0.00	
T8	60 - 40	Leg	Max. Mx	24	10.40	0.16	0.01	
			Max. My	33	-12.71	-0.00	-0.02	
			Max. Vy	24	-0.05	0.16	0.01	
			Max. Vx	33	0.00	0.00	0.00	
			Max Tension	22	260.54	-5.09	-0.04	
		Diagonal	Max. Compression	24	-300.92	4.40	0.00	
			Max. Mx	24	-273.35	5.78	0.02	
			Max. My	26	-18.68	-0.68	-5.57	
			Max. Vy	32	0.18	-5.66	0.01	
			Max. Vx	28	-0.16	-0.66	5.55	
T9	40 - 20	Leg	Max Tension	34	13.33	0.00	0.00	
			Max. Compression	34	-13.71	0.00	0.00	
			Max. Mx	24	10.75	0.20	0.01	
			Max. My	32	-11.49	0.04	-0.02	
			Max. Vy	22	0.06	0.20	0.01	
		Diagonal	Max. Vx	32	0.00	0.00	0.00	
			Max Tension	27	303.77	-3.51	0.02	
			Max. Compression	24	-353.92	0.09	-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
T10	20 - 0	Diagonal	Max. Mx	27	303.08	-10.33	0.01
			Max. My	26	-19.49	-0.68	-5.57
			Max. Vy	19	0.85	7.81	0.00
			Max. Vx	28	0.19	2.14	4.92
			Max Tension	34	14.44	0.00	0.00
			Max. Compression	34	-14.04	0.00	0.00
			Max. Mx	24	11.01	0.19	0.01
			Max. My	33	-12.42	0.05	-0.02
			Max. Vy	27	0.07	0.19	0.01
			Max. Vx	33	0.00	0.00	0.00
		Leg	Max Tension	27	341.18	2.31	0.04
			Max. Compression	24	-403.41	-0.00	-0.00
			Max. Mx	24	-376.04	13.36	0.02
			Max. My	26	-28.17	7.75	-9.77
			Max. Vy	24	1.40	13.36	0.02
			Max. Vx	28	1.06	7.77	9.74
			Max Tension	33	17.58	0.00	0.00
			Max. Compression	34	-15.72	0.00	0.00
			Max. Mx	27	8.38	0.26	0.02
			Max. My	33	-15.37	0.10	-0.03
Max. Vy	27	0.07	0.26	0.02			
Max. Vx	33	0.00	0.00	0.00			

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	411.14	33.08	-19.13
	Max. H <sub>x</sub>	30	411.14	33.08	-19.13
	Max. H <sub>z</sub>	21	-340.62	-38.09	23.08
	Min. Vert	22	-353.55	-39.75	22.96
	Min. H <sub>x</sub>	22	-353.55	-39.75	22.96
	Min. H <sub>z</sub>	30	411.14	33.08	-19.13
Leg B	Max. Vert	24	412.70	-33.11	-19.29
	Max. H <sub>x</sub>	32	-352.96	39.64	23.13
	Max. H <sub>z</sub>	33	-340.04	37.95	23.29
	Min. Vert	32	-352.96	39.64	23.13
	Min. H <sub>x</sub>	24	412.70	-33.11	-19.29
	Min. H <sub>z</sub>	24	412.70	-33.11	-19.29
Leg A	Max. Vert	19	409.88	0.15	38.15
	Max. H <sub>x</sub>	31	26.25	3.73	-4.02
	Max. H <sub>z</sub>	19	409.88	0.15	38.15
	Min. Vert	27	-354.31	-0.10	-45.97
	Min. H <sub>x</sub>	23	25.61	-3.67	-4.08
	Min. H <sub>z</sub>	27	-354.31	-0.10	-45.97

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	48.53	0.00	0.00	3.84	-0.49	-0.00



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Load Combination	Vertical	Shear <sub>x</sub>	Shear <sub>z</sub>	Overturning Moment, M <sub>x</sub>	Overturning Moment, M <sub>z</sub>	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 0 deg - No Ice	48.53	-0.02	-58.34	-5439.39	0.50	-1.14
Dead+Wind 30 deg - No Ice	48.53	28.71	-49.80	-4662.81	-2690.86	0.49
Dead+Wind 45 deg - No Ice	48.53	40.77	-40.46	-3788.57	-3835.43	1.86
Dead+Wind 60 deg - No Ice	48.53	49.89	-28.48	-2664.41	-4699.74	3.22
Dead+Wind 90 deg - No Ice	48.53	57.69	0.24	34.29	-5419.87	4.25
Dead+Wind 120 deg - No Ice	48.53	50.67	29.50	2757.69	-4741.36	4.19
Dead+Wind 135 deg - No Ice	48.53	40.81	40.80	3829.26	-3841.68	3.55
Dead+Wind 150 deg - No Ice	48.53	29.00	49.99	4688.11	-2731.96	3.28
Dead+Wind 180 deg - No Ice	48.53	0.21	57.57	5413.40	-27.30	3.39
Dead+Wind 210 deg - No Ice	48.53	-28.78	49.88	4675.02	2703.66	-0.26
Dead+Wind 225 deg - No Ice	48.53	-40.64	40.68	3814.51	3820.05	-1.29
Dead+Wind 240 deg - No Ice	48.53	-50.52	29.38	2744.77	4719.98	-1.69
Dead+Wind 270 deg - No Ice	48.53	-57.59	0.10	19.73	5404.47	-2.03
Dead+Wind 300 deg - No Ice	48.53	-49.79	-28.67	-2686.67	4683.64	-1.84
Dead+Wind 315 deg - No Ice	48.53	-40.70	-40.61	-3806.45	3822.34	-1.78
Dead+Wind 330 deg - No Ice	48.53	-28.75	-49.88	-4673.26	2692.94	-2.44
Dead+Ice+Temp	82.54	-0.00	-0.00	8.83	-4.66	-0.00
Dead+Wind 0 deg+Ice+Temp	82.54	-0.01	-68.98	-6622.81	-4.25	5.25
Dead+Wind 30 deg+Ice+Temp	82.54	34.04	-59.01	-5700.79	-3298.22	2.56
Dead+Wind 45 deg+Ice+Temp	82.54	48.24	-47.99	-4637.48	-4685.19	1.37
Dead+Wind 60 deg+Ice+Temp	82.54	59.00	-33.80	-3264.57	-5736.40	0.18
Dead+Wind 90 deg+Ice+Temp	82.54	68.29	0.19	32.96	-6622.40	-2.92
Dead+Wind 120 deg+Ice+Temp	82.54	59.86	34.75	3350.08	-5769.61	-5.23
Dead+Wind 135 deg+Ice+Temp	82.54	48.26	48.26	4680.93	-4689.93	-5.92
Dead+Wind 150 deg+Ice+Temp	82.54	34.27	59.16	5732.15	-3330.87	-5.82
Dead+Wind 180 deg+Ice+Temp	82.54	0.16	68.08	6613.36	-25.98	-3.38
Dead+Wind 210 deg+Ice+Temp	82.54	-34.10	59.08	5721.89	3299.95	-2.38
Dead+Wind 225 deg+Ice+Temp	82.54	-48.14	48.16	4669.47	4664.27	-0.91
Dead+Wind 240 deg+Ice+Temp	82.54	-59.74	34.66	3340.20	5744.03	1.07
Dead+Wind 270 deg+Ice+Temp	82.54	-68.21	0.09	21.88	6601.36	4.69
Dead+Wind 300 deg+Ice+Temp	82.54	-58.91	-33.95	-3281.96	5714.52	7.02
Dead+Wind 315 deg+Ice+Temp	82.54	-48.18	-48.11	-4651.49	4665.58	7.33
Dead+Wind 330 deg+Ice+Temp	82.54	-34.07	-59.08	-5708.94	3290.70	6.49
Dead+Wind 0 deg - Service	48.53	-0.01	-20.19	-1879.68	-0.15	-0.40
Dead+Wind 30 deg - Service	48.53	9.93	-17.23	-1610.96	-931.43	0.16
Dead+Wind 45 deg - Service	48.53	14.11	-14.00	-1308.45	-1327.48	0.64
Dead+Wind 60 deg - Service	48.53	17.26	-9.85	-919.46	-1626.56	1.12
Dead+Wind 90 deg - Service	48.53	19.96	0.08	14.37	-1875.74	1.48
Dead+Wind 120 deg - Service	48.53	17.53	10.21	956.74	-1640.96	1.45
Dead+Wind 135 deg - Service	48.53	14.12	14.12	1327.53	-1329.65	1.22
Dead+Wind 150 deg - Service	48.53	10.04	17.30	1624.71	-945.65	1.12
Dead+Wind 180 deg - Service	48.53	0.07	19.92	1875.68	-9.77	1.17
Dead+Wind 210 deg - Service	48.53	-9.96	17.26	1620.18	935.22	-0.08
Dead+Wind 225 deg - Service	48.53	-14.06	14.08	1322.43	1321.53	-0.44
Dead+Wind 240 deg - Service	48.53	-17.48	10.17	952.27	1632.93	-0.59
Dead+Wind 270 deg - Service	48.53	-19.93	0.04	9.33	1869.78	-0.72
Dead+Wind 300 deg - Service	48.53	-17.23	-9.92	-927.16	1620.35	-0.63
Dead+Wind 315 deg - Service	48.53	-14.08	-14.05	-1314.64	1322.31	-0.61
Dead+Wind 330 deg - Service	48.53	-9.95	-17.26	-1614.58	931.51	-0.83

## 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	-48.53	0.00	0.00	48.53	0.00	0.000%
2	-0.02	-48.53	-58.34	0.02	48.53	58.34	0.000%
3	28.71	-48.53	-49.80	-28.71	48.53	49.80	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	
4	40.77	-48.53	-40.46	-40.77	48.53	40.46	0.000%
5	49.89	-48.53	-28.48	-49.89	48.53	28.48	0.000%
6	57.69	-48.53	0.24	-57.69	48.53	-0.24	0.000%
7	50.67	-48.53	29.50	-50.67	48.53	-29.50	0.000%
8	40.81	-48.53	40.80	-40.81	48.53	-40.80	0.000%
9	29.00	-48.53	49.99	-29.00	48.53	-49.99	0.000%
10	0.21	-48.53	57.57	-0.21	48.53	-57.57	0.000%
11	-28.78	-48.53	49.88	28.78	48.53	-49.88	0.000%
12	-40.64	-48.53	40.68	40.64	48.53	-40.68	0.000%
13	-50.52	-48.53	29.38	50.52	48.53	-29.38	0.000%
14	-57.59	-48.53	0.10	57.59	48.53	-0.10	0.000%
15	-49.79	-48.53	-28.67	49.79	48.53	28.67	0.000%
16	-40.70	-48.53	-40.61	40.70	48.53	40.61	0.000%
17	-28.75	-48.53	-49.88	28.75	48.53	49.88	0.000%
18	0.00	-82.54	0.00	0.00	82.54	0.00	0.000%
19	-0.01	-82.54	-68.98	0.01	82.54	68.98	0.000%
20	34.04	-82.54	-59.01	-34.04	82.54	59.01	0.000%
21	48.24	-82.54	-47.99	-48.24	82.54	47.99	0.000%
22	59.00	-82.54	-33.80	-59.00	82.54	33.80	0.000%
23	68.29	-82.54	0.19	-68.29	82.54	-0.19	0.000%
24	59.86	-82.54	34.75	-59.86	82.54	-34.75	0.000%
25	48.26	-82.54	48.26	-48.26	82.54	-48.26	0.000%
26	34.27	-82.54	59.16	-34.27	82.54	-59.16	0.000%
27	0.16	-82.54	68.08	-0.16	82.54	-68.08	0.000%
28	-34.10	-82.54	59.08	34.10	82.54	-59.08	0.000%
29	-48.14	-82.54	48.16	48.14	82.54	-48.16	0.000%
30	-59.74	-82.54	34.66	59.74	82.54	-34.66	0.000%
31	-68.21	-82.54	0.09	68.21	82.54	-0.09	0.000%
32	-58.91	-82.54	-33.95	58.91	82.54	33.95	0.000%
33	-48.18	-82.54	-48.11	48.18	82.54	48.11	0.000%
34	-34.07	-82.54	-59.08	34.07	82.54	59.08	0.000%
35	-0.01	-48.53	-20.19	0.01	48.53	20.19	0.000%
36	9.93	-48.53	-17.23	-9.93	48.53	17.23	0.000%
37	14.11	-48.53	-14.00	-14.11	48.53	14.00	0.000%
38	17.26	-48.53	-9.85	-17.26	48.53	9.85	0.000%
39	19.96	-48.53	0.08	-19.96	48.53	-0.08	0.000%
40	17.53	-48.53	10.21	-17.53	48.53	-10.21	0.000%
41	14.12	-48.53	14.12	-14.12	48.53	-14.12	0.000%
42	10.04	-48.53	17.30	-10.04	48.53	-17.30	0.000%
43	0.07	-48.53	19.92	-0.07	48.53	-19.92	0.000%
44	-9.96	-48.53	17.26	9.96	48.53	-17.26	0.000%
45	-14.06	-48.53	14.08	14.06	48.53	-14.08	0.000%
46	-17.48	-48.53	10.17	17.48	48.53	-10.17	0.000%
47	-19.93	-48.53	0.04	19.93	48.53	-0.04	0.000%
48	-17.23	-48.53	-9.92	17.23	48.53	9.92	0.000%
49	-14.08	-48.53	-14.05	14.08	48.53	14.05	0.000%
50	-9.95	-48.53	-17.26	9.95	48.53	17.26	0.000%

### Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001



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5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000078
20	Yes	4	0.00000001	0.00000120
21	Yes	4	0.00000001	0.00000118
22	Yes	4	0.00000001	0.00000112
23	Yes	4	0.00000001	0.00000122
24	Yes	4	0.00000001	0.00000088
25	Yes	4	0.00000001	0.00000101
26	Yes	4	0.00000001	0.00000116
27	Yes	4	0.00000001	0.00000111
28	Yes	4	0.00000001	0.00000119
29	Yes	4	0.00000001	0.00000101
30	Yes	4	0.00000001	0.00000087
31	Yes	4	0.00000001	0.00000123
32	Yes	4	0.00000001	0.00000114
33	Yes	4	0.00000001	0.00000115
34	Yes	4	0.00000001	0.00000116
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 150	5.662	35	0.3043	0.0287
T2	150 - 140	4.409	40	0.2807	0.0245
T3	140 - 120	3.831	40	0.2644	0.0210
T4	120 - 100	2.787	40	0.2205	0.0097
T5	100 - 90	1.900	40	0.1812	0.0031
T6	90 - 80	1.532	40	0.1569	0.0020
T7	80 - 60	1.208	40	0.1385	0.0016
T8	60 - 40	0.682	40	0.0955	0.0011

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T9	40 - 20	0.325	40	0.0599	0.0007
T10	20 - 0	0.102	40	0.0301	0.0004

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
183.00	101-90-08-0-01	35	5.662	0.3043	0.0287	115352
179.75	15' Mount Pipe	35	5.662	0.3043	0.0287	115352
178.00	2.5" x 20'6" Whip	35	5.662	0.3043	0.0287	115352
175.00	2.5" x 14' Omni	35	5.662	0.3043	0.0287	115352
174.00	1.5" x 12' Omni	35	5.662	0.3043	0.0287	115352
168.00	HPD2-4.7	35	5.533	0.3021	0.0284	115352
159.50	APXV18-206517S-C w/ mounting hardware	40	4.992	0.2927	0.0267	54929
158.50	SC420-HF1LDF	40	4.929	0.2916	0.0265	50153
144.00	2.5" x 20'6" Whip	40	4.057	0.2715	0.0226	29253
141.00	2" Dia 15' Omni	40	3.887	0.2662	0.0215	29397
139.00	1.5" x 10' Omni	40	3.775	0.2624	0.0206	29469
138.50	9' Whip	40	3.747	0.2614	0.0203	29504
134.00	VHLP2.5-180	40	3.502	0.2519	0.0179	30006
125.50	Twin PCS TMA	40	3.059	0.2324	0.0128	31106
115.00	Surge Suppressor	40	2.549	0.2110	0.0074	28494
101.00	(2) Diplexer	40	1.940	0.1835	0.0033	22362
87.00	3"x2"x22" Panel	40	1.430	0.1509	0.0019	28714
84.50	TMA	40	1.348	0.1464	0.0018	29377
83.50	3' Stand-off	40	1.316	0.1447	0.0018	29626
83.00	3' Dish	40	1.301	0.1438	0.0017	29741
80.00	3"x2"x22" Panel	40	1.208	0.1385	0.0016	30140
30.00	Camera	40	0.197	0.0448	0.0005	35639
24.00	PC9013N	40	0.136	0.0360	0.0004	32970

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 150	19.909	24	1.0435	0.1176
T2	150 - 140	15.590	24	0.9732	0.0938
T3	140 - 120	13.566	24	0.9234	0.0796
T4	120 - 100	9.878	24	0.7814	0.0435
T5	100 - 90	6.728	24	0.6437	0.0220
T6	90 - 80	5.417	24	0.5574	0.0173
T7	80 - 60	4.265	24	0.4919	0.0138
T8	60 - 40	2.401	24	0.3387	0.0082
T9	40 - 20	1.138	24	0.2118	0.0048
T10	20 - 0	0.353	24	0.1063	0.0023



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### Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
183.00	101-90-08-0-01	24	19.909	1.0435	0.1176	40660
179.75	15' Mount Pipe	24	19.909	1.0435	0.1176	40660
178.00	2.5" x 20'6" Whip	24	19.909	1.0435	0.1176	40660
175.00	2.5" x 14' Omni	24	19.909	1.0435	0.1176	40660
174.00	1.5" x 12' Omni	24	19.909	1.0435	0.1176	40660
168.00	HPD2-4.7	24	19.470	1.0371	0.1149	40660
159.50	APXV18-206517S-C w/ mounting hardware	24	17.612	1.0093	0.1034	19362
158.50	SC420-HF1LDF	24	17.396	1.0058	0.1025	17678
144.00	2.5" x 20'6" Whip	24	14.362	0.9455	0.0859	9871
141.00	2" Dia 15' Omni	24	13.764	0.9293	0.0812	9728
139.00	1.5" x 10' Omni	24	13.371	0.9173	0.0779	9671
138.50	9' Whip	24	13.273	0.9142	0.0770	9660
134.00	VHLP2.5-180	24	12.409	0.8839	0.0686	9635
125.50	Twin PCS TMA	24	10.844	0.8211	0.0519	9614
115.00	Surge Suppressor	24	9.032	0.7486	0.0370	8364
101.00	(2) Diplexer	24	6.869	0.6520	0.0227	6250
87.00	3"x2"x22" Panel	24	5.056	0.5361	0.0162	8015
84.50	TMA	24	4.765	0.5202	0.0153	8192
83.50	3' Stand-off	24	4.651	0.5140	0.0150	8258
83.00	3' Dish	24	4.595	0.5109	0.0148	8289
80.00	3"x2"x22" Panel	24	4.265	0.4919	0.0138	8395
30.00	Camera	24	0.685	0.1582	0.0035	9983
24.00	PC9013N	24	0.470	0.1270	0.0028	9239

### Bolt Design Data

Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load Allowable	Allowable Ratio	Criteria
	ft			in						
T1	170	Diagonal	A325N	0.6250	1	2.99	6.44	0.464 ✓	1.333	Bolt Shear
T2	150	Leg	A325N	1.0000	6	4.73	34.56	0.137 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4.49	9.52	0.472 ✓	1.333	Member Bearing
		Top Girt	A325N	1.0000	1	0.33	9.52	0.035 ✓	1.333	Member Bearing
T3	140	Leg	A325N	1.0000	6	7.11	34.56	0.206 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	8.41	9.52	0.884 ✓	1.333	Member Bearing
T4	120	Leg	A325N	1.0000	6	13.71	34.56	0.397 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	11.07	9.52	1.164 ✓	1.333	Member Bearing
		Mid Girt	A325N	1.0000	1	2.95	9.52	0.310 ✓	1.333	Member Bearing
T5	100	Leg	A325N	1.0000	6	22.29	34.56	0.645 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	12.88	15.86	0.812 ✓	1.333	Member Bearing
T6	90	Leg	A325N	1.0000	6	26.98	34.56	0.781 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	12.75	15.86	0.804 ✓	1.333	Member Bearing
T7	80	Leg	A325N	1.0000	6	31.27	34.56	0.905 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	13.06	15.86	0.823 ✓	1.333	Member Bearing



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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load Allowable	Allowable Ratio	Criteria
T8	60	Leg	A325N	1.2500	6	39.62	54.00	0.734 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	13.33	20.39	0.654 ✓	1.333	Member Bearing
T9	40	Leg	A325N	1.2500	6	47.25	54.00	0.875 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	14.44	20.39	0.708 ✓	1.333	Member Bearing
T10	20	Diagonal	A325N	1.2500	1	17.58	16.31	1.078 ✓	1.333	Member Bearing

### Compression Checks

### Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T1	170 - 150	1 3/4	20.00	2.49	68.3 K=1.00	21.253	2.4053	-28.98	51.12	0.567 ✓
T2	150 - 140	Pirod 105244	10.02	10.02	45.4 K=1.00	25.051	3.6816	-34.11	92.23	0.370 ✓
T3	140 - 120	Pirod 105216	20.03	10.02	45.4 K=1.00	25.051	3.6816	-72.96	92.23	0.791 ✓
T4	120 - 100	Pirod 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-124.88	138.54	0.901 ✓
T5	100 - 90	Pirod 105217	10.02	10.02	37.8 K=1.00	26.132	5.3014	-155.95	138.54	1.126 ✓
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5 K=1.00	26.968	7.6570	-187.55	206.49	0.908 ✓
T7	80 - 60	Pirod 105218	20.03	10.02	32.4 K=1.00	26.848	7.2158	-245.49	193.73	1.267 ✓
T8	60 - 40	Pirod 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-300.92	257.78	1.167 ✓
T9	40 - 20	Pirod 105219 reinf w/ 1" dia bar	20.03	10.02	25.4 K=1.00	27.705	11.7803	-353.92	326.37	1.084 ✓
T10	20 - 0	Pirod 105220	20.03	10.02	25.2 K=1.00	27.723	11.9282	-403.41	330.69	1.220 ✓

### Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L <sub>d</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual V K	Allow. V <sub>a</sub> K	Stress Ratio
T2	150 - 140	0.5	1.48	121.0	10.193	0.1963	0.79	2.24	0.351 ✓
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.73	2.23	0.328 ✓



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Section No.	Elevation ft	Diagonal Size	$L_u$ ft	$Kl/r$	$F_a$ ksi	$A$ in <sup>2</sup>	Actual $V$ K	Allow. $V_a$ K	Stress Ratio
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.51	2.26	0.670 ✓
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.52	2.26	0.232 ✓
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.37	2.30	0.160 ✓
T7	80 - 60	0.5	1.46	119.0	10.423	0.1963	0.36	2.29	0.159 ✓
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.20	4.69	0.042 ✓
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.85	5.54	0.153 ✓
T10	20 - 0	0.625	1.43	93.6	13.766	0.3068	1.47	4.73	0.311 ✓

### Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	$L$ ft	$L_u$ ft	$Kl/r$	$F_a$ ksi	$A$ in <sup>2</sup>	Actual $P$ K	Allow. $P_a$ K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.59	2.71	111.6 K=0.75	12.001	0.6013	-2.99	7.22	0.414 ✓
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.00	121.3 K=1.00	10.097	0.9020	-4.99	9.11	0.548 ✓
T3	140 - 120	L3x3x3/16	12.50	5.65	115.3 K=1.01	10.840	1.0900	-8.79	11.82	0.744 ✓
T4	120 - 100	L3x3x3/16	13.80	6.35	127.8 K=1.00	9.141	1.0900	-11.76	9.96	1.180 ✓
T5	100 - 90	L3x3x5/16	14.50	6.72	136.9 K=1.00	7.969	1.7800	-13.20	14.19	0.931 ✓
T6	90 - 80	L3x3x5/16	15.24	7.10	144.7 K=1.00	7.132	1.7800	-13.00	12.69	1.024 ✓
T7	80 - 60	L3x3x5/16	16.80	7.90	161.0 K=1.00	5.760	1.7800	-13.56	10.25	1.323 ✓
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.70	151.3 K=1.00	6.527	2.0900	-13.71	13.64	1.005 ✓
T9	40 - 20	L3 1/2x3 1/2x5/16	20.16	9.56	166.3 K=1.00	5.400	2.0900	-13.06	11.29	1.157 ✓
T10	20 - 0	L4x4x1/4	21.03	10.01	151.1 K=1.00	6.542	1.9400	-15.72	12.69	1.238 ✓

### Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	$L$ ft	$L_u$ ft	$Kl/r$	$F_a$ ksi	$A$ in <sup>2</sup>	Actual $P$ K	Allow. $P_a$ K	Ratio $\frac{P}{P_a}$
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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T1	170 - 150	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.13	2.58	0.052 ✓
T2	150 - 140	L3x3x3/16	5.00	4.48	105.1 K=1.17	12.131	1.0900	-0.28	13.22	0.021 ✓

### Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T1	170 - 150	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.13	2.58	0.049 ✓

### Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T4	120 - 100	L3x3x3/16	9.00	7.63	153.5 K=1.00	6.336	1.0900	-2.28	6.91	0.331 ✓

### Tension Checks

### Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T1	170 - 150	1 3/4	20.00	2.49	68.3	30.000	2.4053	23.82	72.16	0.330 ✓
T2	150 - 140	Pirod 105244	10.02	10.02	45.4	30.000	3.6816	28.39	110.45	0.257 ✓
T3	140 - 120	Pirod 105216	20.03	10.02	45.4	30.000	3.6816	60.64	110.45	0.549 ✓
T4	120 - 100	Pirod 105217	20.03	10.02	37.8	30.000	5.3014	106.53	159.04	0.670 ✓
T5	100 - 90	Pirod 105217	10.02	10.02	37.8	30.000	5.3014	133.71	159.04	0.841 ✓
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5	30.000	7.6570	161.90	229.71	0.705 ✓
T7	80 - 60	Pirod 105218	20.03	10.02	32.4	30.000	7.2158	213.01	216.47	0.984 ✓
T8	60 - 40	Pirod 105219	20.03	10.02	28.4	30.000	9.4248	260.54	282.74	0.921 ✓



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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	KI/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4	30.000	11.7803	303.75	353.41	0.859 ✓
T10	20 - 0	Pirod 105220	20.03	10.02	25.2	30.000	11.9282	341.18	357.85	0.953 ✓

### Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L <sub>d</sub> ft	KI/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual V K	Allow. V <sub>a</sub> K	Stress Ratio
T2	150 - 140	0.5	1.48	121.0	10.193	0.1963	0.79	2.24	0.351 ✓
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.73	2.23	0.328 ✓
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.51	2.26	0.670 ✓
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.52	2.26	0.232 ✓
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.37	2.30	0.160 ✓
T7	80 - 60	0.5	1.46	119.0	10.423	0.1963	0.36	2.29	0.159 ✓
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.20	4.69	0.042 ✓
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.85	5.54	0.153 ✓
T10	20 - 0	0.625	1.43	93.6	13.766	0.3068	1.47	4.73	0.311 ✓

### Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	KI/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T1	170 - 150	7/8	5.59	2.71	148.7	30.000	0.6013	2.94	18.04	0.163 ✓
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.00	80.1	21.600	0.9020	4.49	19.48	0.230 ✓
T3	140 - 120	L3x3x3/16	12.50	5.65	74.6	21.600	1.0900	8.41	23.54	0.357 ✓
T4	120 - 100	L3x3x3/16	13.80	6.35	83.5	21.600	1.0900	11.07	23.54	0.470 ✓
T5	100 - 90	L3x3x5/16	14.50	6.72	89.9	21.600	1.7800	12.88	38.45	0.335 ✓
T6	90 - 80	L3x3x5/16	15.24	7.10	94.9	21.600	1.7800	12.75	38.45	0.332 ✓

<b>tnxTower</b>  <b>URS Corporation</b> 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	<b>Job</b>	PIROD U20'-0"x170' Lattice Tower	<b>Page</b>	41 of 42
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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T7	80 - 60	L3x3x5/16	16.80	7.90	105.3	21.600	1.7800	13.06	38.45	0.340
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.70	99.2	21.600	2.0900	13.33	45.14	0.295
T9	40 - 20	L3 1/2x3 1/2x5/16	20.16	9.56	108.8	21.600	2.0900	14.44	45.14	0.320
T10	20 - 0	L4x4x1/4	21.92	10.45	102.5	21.600	1.9400	17.58	41.90	0.420

**Top Girt Design Data (Tension)**

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T1	170 - 150	7/8	5.00	4.85	266.3	30.000	0.6013	0.10	18.04	0.006
T2	150 - 140	L3x3x3/16	5.00	4.48	62.0	21.600	1.0900	0.33	23.54	0.014

**Bottom Girt Design Data (Tension)**

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T1	170 - 150	7/8	5.00	4.85	266.3	30.000	0.6013	0.13	18.04	0.007

**Mid Girt Design Data (Tension)**

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
T4	120 - 100	L3x3x3/16	9.00	7.63	102.2	21.600	1.0900	2.95	23.54	0.125

**Section Capacity Table**

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P <sub>allow</sub> K	% Capacity	Pass Fail
T1	170 - 150	Leg	1 3/4	3	-28.98	68.14	42.5	Pass
T2	150 - 140	Leg	Pirod 105244	60	-34.11	122.94	27.7	Pass
T3	140 - 120	Leg	Pirod 105216	72	-72.96	122.94	59.3	Pass



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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P <sub>allow</sub> K	% Capacity	Pass Fail	
T4	120 - 100	Leg	Pirod 105217	86	-124.88	184.67	67.6	Pass	
T5	100 - 90	Leg	Pirod 105217	104	-155.95	184.67	84.4	Pass	
T6	90 - 80	Leg	Pirod 105217 reinf w/ 1" dia bar	113	-187.55	275.26	68.1	Pass	
T7	80 - 60	Leg	Pirod 105218	122	-245.49	258.24	95.1	Pass	
T8	60 - 40	Leg	Pirod 105219	137	-300.92	343.62	87.6	Pass	
T9	40 - 20	Leg	Pirod 105219 reinf w /1" dia bar	152	-353.92	435.06	81.4	Pass	
T10	20 - 0	Leg	Pirod 105220	167	-403.41	440.81	91.5	Pass	
T1	170 - 150	Diagonal	7/8	12	-2.99	9.62	31.1	Pass	
T2	150 - 140	Diagonal	L2 1/2x2 1/2x3/16	66	-4.99	12.14	41.1	Pass	
T3	140 - 120	Diagonal	L3x3x3/16	78	-8.79	15.75	55.8	Pass	
T4	120 - 100	Diagonal	L3x3x3/16	93	-11.76	13.28	88.5	Pass	
T5	100 - 90	Diagonal	L3x3x5/16	108	-13.20	18.91	69.8	Pass	
T6	90 - 80	Diagonal	L3x3x5/16	117	-13.00	16.92	76.8	Pass	
T7	80 - 60	Diagonal	L3x3x5/16	126	-13.56	13.67	99.2	Pass	
T8	60 - 40	Diagonal	L3 1/2x3 1/2x5/16	142	-13.71	18.18	75.4	Pass	
T9	40 - 20	Diagonal	L3 1/2x3 1/2x5/16	157	-13.06	15.04	86.8	Pass	
T10	20 - 0	Diagonal	L4x4x1/4	178	-15.72	16.92	92.9	Pass	
T1	170 - 150	Top Girt	7/8	6	-0.13	3.45	3.9	Pass	
T2	150 - 140	Top Girt	L3x3x3/16	63	-0.28	17.63	1.6	Pass	
T1	170 - 150	Bottom Girt	7/8	9	-0.13	3.45	3.7	Pass	
T4	120 - 100	Mid Girt	L3x3x3/16	88	-2.28	9.21	24.8	Pass	
							Summary		
							Leg (T7)	95.1	Pass
							Diagonal (T7)	99.2	Pass
							Top Girt (T1)	3.9	Pass
							Bottom Girt (T1)	3.7	Pass
							Mid Girt (T4)	24.8	Pass
							Bolt Checks	87.3	Pass
							<b>RATING =</b>	<b>99.2</b>	<b>Pass</b>

# ANCHOR BOLT EVALUATION



## ANCHOR BOLT ANALYSIS

### Input Data

#### Max Pier Reactions:

Uplift:	Uplift := 354 kips	<i>user input</i>
Shear:	Shear := 46 kips	<i>user input</i>
Compression:	Compression := 413 kips	<i>user input</i>

#### Anchor Bolt Data:

Use ASTM A687 Grade

Number of Anchor Bolts = N	$N := 6$	<i>user input</i>
Bolt Ultimate Strength:	$F_u := 150 \text{ ksi}$	<i>user input</i>
Bolt Yield Strength:	$F_y := 105 \text{ ksi}$	<i>user input</i>
Bolt Modulus:	$E := 29000 \text{ ksi}$	<i>user input</i>
Thickness of Anchor Bolts	$D := 1.25 \text{ in}$	<i>user input</i>
Threads per Inch:	$n := 7$	<i>user input</i>
Coefficient of Friction:	$\mu := 0.55$	<i>user input</i> (for baseplate with grout ASCE 10-97)

**Anchor Bolt Area:**

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \quad A_g = 1.227 \cdot \text{in}^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left( D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 \quad A_n = 0.969 \cdot \text{in}^2$$

**Check Tensile Forces:**

Maximum Tensile Force (Gross Area):

$$\text{AllowableTension} := 1.33 \cdot (0.33 \cdot A_g \cdot F_u) \quad \text{AllowableTension} = 80.8 \cdot \text{kips}$$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{\text{net.area}} := 1.33 \cdot (0.60 \cdot A_n \cdot F_y) \quad F_{\text{net.area}} = 81.2 \cdot \text{kips}$$

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$\text{MaxTension} := \frac{\text{Uplift}}{N} \quad \text{MaxTension} = 59.0 \cdot \text{kips}$$

Check Stresses:

$$\frac{\text{MaxTension}}{F_{\text{net.area}}} = 0.73$$

$$\text{Condition1} := \text{if} \left( \frac{\text{MaxTension}}{F_{\text{net.area}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

**Condition1 = "OK"**



**Check Anchor Bolt Area:**

Based on the ASCE 10-97 Design of Latticed Steel Transmission Structures

Required Area:

$$A_{s1} := \frac{\text{Uplift}}{F_y} + \frac{\text{Shear}}{\mu \cdot 0.85 \cdot F_y} \quad A_{s1} = 4.3 \cdot \text{in}^2$$

$$A_{s2} := \left| \frac{\text{Shear} - (0.3 \cdot \text{Compression})}{\mu \cdot 0.85 \cdot F_y} \right| \quad A_{s2} = 1.6 \cdot \text{in}^2$$

Provided Area:

$$A_{\text{sprovided}} := A_n \cdot N \quad A_{\text{sprovided}} = 5.8 \cdot \text{in}^2$$

$$\text{Condition2} := \text{if} \left( \frac{A_{s1}}{A_{\text{sprovided}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right) \quad \frac{A_{s1}}{A_{\text{sprovided}}} = 0.74$$

**Condition2 = "OK"**

$$\text{Condition3} := \text{if} \left( \frac{A_{s2}}{A_{\text{sprovided}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right) \quad \frac{A_{s2}}{A_{\text{sprovided}}} = 0.27$$

**Condition3 = "OK"**

# FOUNDATION EVALUATION



## FOUNDATION ANALYSIS

### Input Data

#### Maximum Pier Reactions:

Compression:  $C_t := 413 \text{ kips}$  *user input*  
 Uplift:  $U_t := 354 \text{ kips}$  *user input*

#### Material Properties:

Unit Weight of Concrete:  $\gamma_c := 150 \text{ pcf}$  *user input*  
 Unit Weight of Water:  $\gamma_w := 62.4 \text{ pcf}$  *user input*  
 Unit Weight of Soil:  $\gamma_s := 100 \text{ pcf}$  *user input*

#### Foundation Dimensions:

Drilled Caisson Length:  $C_{\text{Length}} := 41.5 \text{ ft}$  *user input*  
 Diameter of Pier:  $d_p := 5.5 \text{ ft}$  *user input*  
 Extension of Pier Above Grade:  $L_{\text{pag}} := 0.5 \text{ ft}$  *user input*

Allowable Soil Bearing Capacity (Allowable Bearing Pressure at Depth 41')  $q_s := 6 \text{ ksf}$  *user input*  
 Water Table Below Grade:  $Wd := 41 \text{ ft}$  *user input*

Additional Concrete  $Conc_{\text{addl}} := 5 \text{ ft} \cdot \left( 13 \text{ ft} \cdot 13 \text{ ft} - \frac{\pi \cdot d_p^2}{4} \right)$   
 $Conc_{\text{addl}} = 726.2 \text{ ft}^3$

Average Allowable Shear:  $fl := 859 \text{ psf}$  *user input*  
 Depth Neglected for Skin Friction at Top:  $Depthunbond := 4 \text{ ft}$  *user input*

Foundation reinforcement per drawings by Tectonic, dated May 5, 2004

#### Loading:

$$TotalDownLoad := C_t + \pi \cdot \frac{d_p^2}{4} \cdot [L_{\text{pag}} \cdot \gamma_c + [\gamma_c \cdot (C_{\text{Length}} - L_{\text{pag}})]]$$

TotalDownLoad = 560.9 kips

$$PierWeight := \pi \cdot \frac{d_p^2}{4} \cdot [(Wd + L_{\text{pag}}) \cdot \gamma_c + (C_{\text{Length}} - Wd - L_{\text{pag}}) \cdot (\gamma_c - \gamma_w)] + Conc_{\text{addl}} \cdot \gamma_c$$

PierWeight = 256.8 kips

$$SoilShear := \pi \cdot d_p \cdot [fl \cdot (C_{\text{Length}} - Depthunbond)]$$

SoilShear = 556.6 kips

## Compression Capacity:

$$\text{TotalDownLoadCapacity} := \text{SoilShear} + q_s \cdot \left( \pi \cdot \frac{d_p^2}{4} \right)$$

$$\text{TotalDownLoadCapacity} = 699.1 \cdot \text{kips}$$

$$\text{CheckDownLoadCapacity} := \text{if}(\text{TotalDownLoad} < \text{TotalDownLoadCapacity}, \text{"Okay"}, \text{"No Good"})$$

$$\text{CheckDownLoadCapacity} = \text{"Okay"}$$

## Tension Capacity:

$$\text{TotalUpLiftCapacity} := \text{SoilShear} + \text{PierWeight}$$

$$\text{TotalUpLiftCapacity} = 813.4 \cdot \text{kips}$$

$$\text{CheckUpLiftCapacity} := \text{if}(U_t < \text{TotalUpLiftCapacity}, \text{"Okay"}, \text{"No Good"})$$

$$\text{CheckUpLiftCapacity} = \text{"Okay"}$$

$$\text{SafetyFactor}_{\text{provided}} := \frac{\text{TotalUpLiftCapacity}}{U_t}$$

$$\text{SafetyFactor}_{\text{provided}} = 2.30$$

## Check Cone Failure:

$$\text{ConeFailureCapacity} := \frac{[(C_{\text{Length}} - L_{\text{pag}}) \cdot \tan(30\text{deg}) \cdot 2 + d_p]^2 \cdot \pi \cdot C_{\text{Length}} - L_{\text{pag}}}{4} \cdot \gamma_s$$

$$\text{ConeFailureCapacity} = 2997.25 \cdot \text{kips}$$

$$\text{CheckConeFailureCapacity} := \text{if}(U_t < \text{ConeFailureCapacity}, \text{"Okay"}, \text{"No Good"})$$

$$\text{CheckConeFailureCapacity} = \text{"Okay"}$$

$$\text{ConeSafetyFactor}_{\text{provided}} := \frac{\text{ConeFailureCapacity}}{U_t}$$

$$\text{ConeSafetyFactor}_{\text{provided}} = 8.47$$