STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

Internet: ct.gov/csc

Daniel F. Caruso
Chairman

January 18, 2011

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-047-101216** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 232 South Main Street, East Windsor, Connecticut.

Dear Attorney Baldwin:

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

- Prior to the antenna/dish installation, the tower shall be modified as specified in the structural analysis prepared by URS, dated November 18, 2010 and stamped by Richard Sambor;
- The tower shall not exceed 100 percent of its post-construction structural rating; and
- Prior to the antenna/dish installation, a signed letter from a Professional Engineer duly licensed in the State of Connecticut shall be submitted to the Council to certify that the reinforcements have been properly completed and the tower does not exceed 100 percent of its post-construction structural rating.
- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated December 16, 2010. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Very truly yours,

Linda Roberts

Linda Roberts
Executive Director

LR/CDM/cm

c: The Honorable Denise Sabotka Menard, First Selectman, Town of East Windsor
Laurie Whitten, Town Planner, Town of East Windsor

ROBINSON & COLE

KENNETH C. BALDWIN

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

EM-VER-047-101216

ORIGINAL

December 16, 2010

RECEIVED
DEC 16 2010
CONNECTICUT
SITING COUNCIL

Via Hand Delivery

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

Re: **Notice of Exempt Modification – Antenna Swap**
232 South Main Street, East Windsor, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains wireless telecommunications antennas at the 144-foot level on the existing 188-foot tower at the above-referenced address. The tower and underlying property are owned by Balch Bridge Street Corporation. The Council approved Cellco's use of the existing tower in 1997. Cellco now intends to modify its facility by replacing six (6) of its PCS antennas with three (3) model MG D3-800T0 PCS antennas and three (3) model P65-15-XL-2 LTE antennas, all at the same 144-foot level on the tower. Cellco will also install three (3) additional cables, for a total of fifteen (15) cables, and three (3) cable diplexers on its antenna platform. Attached behind Tab 1 are the specifications for the proposed replacement antennas.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Denise Menard, First Selectman for the Town of East Windsor.

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

1. The proposed modifications will not result in any increase in the overall height of the existing tower. Cellco's antennas and diplexers will be located at the same 144-foot level on the existing 188-foot tower.

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

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

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

Also attached is a Structural Analysis Report confirming that the tower, with modifications, and foundation can support Cellco's proposed antennas modification. (See Tab 3).

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Denise Menard, East Windsor First Selectman
Balch Bridge Street Corporation
Sandy M. Carter

SINGLE-BAND PANEL ANTENNA

BROADBAND 1700-2170 MHZ

MGD3-800TX

1710-1880	1850-1990	1920-2170
H66° V7.2°	H64° V6.6°	H63° V6.3°
Fixed Tilt 0°2,°4,°6,°	Fixed Tilt 0°2,°4,°6,°	Fixed Tilt 0°2,°4,°6,°

ELECTRICAL SPECIFICATIONS

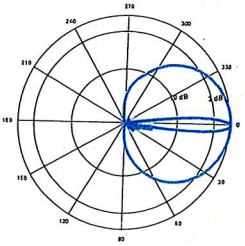
BROADBAND *1710-2170 MHz*

Antenna Model	MGD3-800TX		
Polarization	± 45°		
Frequency	1710 - 1880	1850 - 1990	1920 - 2170
Horizontal Beamwidth	66°	64°	63°
Vertical Beamwidth	7.2°	6.6°	6.3°
Gain (dBi)	17.9	18	18.5
Vertical Electrical Tilt	FIXED 0°, 2°, 4°, 6°	FIXED 0°, 2°, 4°, 6°	FIXED 0°, 2°, 4°, 6°
Upper Sidelobe Suppression for the 1st lobe above main beam (dB)	20	20	20
Front-to-Back Ratio /Cpol @ ± 20° (dB)	> 30	> 30	> 30
VSWR	< 1.4 : 1	< 1.4 : 1	< 1.4 : 1
Cross Polar Ratio @ ± 60° (dB)	> 10	> 10	> 10
Isolation Between Ports (dB)	> 30	> 30	> 30
Maximum Power Per Input (W)	250		
Intermodulation (dBc)	< - 150		
Impedance (Ω)	50		

MECHANICAL SPECIFICATIONS

Connectors	2 X 7/16 Female
Connector Position	Bottom
Survival Wind Speed mph (km/h)	124 (200)
Front Windload lbs (N) @ 160 km/h	83 (370)
Lateral Windload lbs (N) @ 160 km/h	38 (170)
Radome Color	Grey, paintable
Temperature Range F (°C)	-67° to 140° (-55° to +60°)
Humidity	100%
Antenna Weight lbs (kg)	15.43 (7)
Antenna Dimension in (mm) H X W X D	53 X 6.29 X 3.54 (1340 X 160 X 90)

H&V Pattern



RYMSA Telecom Group (Headquarters)

RYMSA TELECOM GROUP

www.rymsawireless.com

RYMSA México

RYMSA Wireless U.S.A.

P65-15-XL-2 : Very Low Broadband Antennas

POLARIZATION: Dual linear ±45°
FREQUENCY (MHz): 698-894
HORIZONTAL BEAM WIDTH (°): 65
GAIN (dBi/dBd): 14.5/12.4
TILT: 2
LENGTH: 48"

ELECTRICAL SPECIFICATIONS*

Frequency range (MHz)		698-894	
Frequency band (MHz)	698-806		806-894
Gain (dBi/dBd)	14.0/11.9		14.5/12.4
Polarization		Dual Linear +/- 45	
Nominal Impedance (Ω)		50	
VSWR		< 1.33:1	
Horizontal beam width, -3 dB (°)	68		65
Vertical beam width, -3 dB (°)	16.5		15.5
Electrical down tilt (°)		2	
Side lobe suppression, vertical 1st upper (dB)	> 15		> 15
Tracking, horizontal plane ±60° (dB)	< 2		< 2
Isolation between inputs (dB)	> 30		> 30
First null fill (dB)	-		-
Vertical beam squint (°)	< 0.5		< 0.5
Front to back ratio (dB)	> 30		> 30
Front to back ratio, total power (dB)	> 25		> 25
Cross polar discrimination (XPD) 0° (dB)	> 15		> 15
Cross polar discrimination (XPD) ±60° (dB)	> 10		> 10
IM3, 2xTx@43dBm (dBc)		-153	
Power handling, average per input (W)		400	
Power handling, average total (W)		800	

MECHANICAL SPECIFICATIONS*

Connector	2 X 7/16 DIN Female
Connector position	Bottom
Dimensions, HxWxD, in (mm)	48"x12"x5" (1219x305x125)
Mounting	Pre-mounted Tilt Brackets
Weight, with brackets, lbs (kg)	33 (15)
Weight, without brackets, lbs (kg)	22 (10)
Wind load, frontal/lateral/rear side 42 m/s Cd=1.0 (N)	920
Maximum operational wind speed, mph (m/s)	100 (45)
Survival wind speed, mph (m/s)	125 (55)
Lightning protection	DC Ground
Radome material	PVC
Packet size, HxWxD, in (mm)	58" x 16" x 10" (1475 x 400 x 255)
Radome colour	Light Grey
Shipping weight, lbs (kg)	44 (20)
RET	N/A
Brackets	7256.00, 7454.00, 2210.00

*All specifications subject to change without notice. Please contact your Powerwave representative for complete performance data.

ANTENNA PATTERNS*

For detailed patterns visit http://www.powerwave.com/rpa/.

	General	Power	Density					
Site Name: East Windsor								
Tower Height: Verizon @ 144Ft.								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*Cingular UMTS	1	500	170	0.0062	880	0.5867	1.06%	
*Cingular GSM	2	296	170	0.0074	880	0.5867	1.26%	
*Cingular GSM	1	427	170	0.0053	1900	1.0000	0.53%	
*Pocket	3	631	177	0.0217	2130	1.0000	2.17%	
*Town	1	400	207	0.0034	33	0.2000	1.68%	
*T-Mobile GSM	8	123	153	0.0151	1945	1.0000	1.51%	
*T-Mobile UMTS	2	694	153	0.0213	2100	1.0000	2.13%	
*Nextel	12	100	183	0.0129	851	0.5673	2.27%	
*Sprint	11	135	126	0.0336	1962.5	1.0000	3.36%	
Verizon	**3**	**295**	**144**	**0.0153**	**970**	**1.0000**	**1.53%**	
Verizon	**9**	**247**	**144**	**0.0385**	**869**	**0.5793**	**6.65%**	
Verizon	**1**	**675**	**144**	**0.0117**	**757**	**0.4973**	**2.35%**	
								26.52%
* Source: Siting Council								

DETAILED STRUCTURAL ANALYSIS AND MODIFICATION OF AN EXISTING 188' ROHN SSV LATTICE TOWER FOR PROPOSED ANTENNA ARRANGEMENT

232 S. Main St.
East Windsor, Connecticut

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

36931196.00000
VZ5-049 (Rev 4)

November 18, 2010

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis and modification of the existing 188' self-supporting lattice tower structure located at 232 S. Main St in East Windsor, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code which requires a three second gust wind speed of 95 mph which converts to a 77.5 mph fastest mile per 2003 IBC (Table 1609.3.1) and the TIA/EIA-222-F standard for a wind velocity of 80 mph (fastest mile). The wind speed from the TIA/EIA-222-F governs the design at 80 mph (fastest mile) and 69 mph (fastest mile) concurrent with ½" ice. The antenna loading considered in this analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report. The proposed Verizon Wireless modification is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove: (6) 948F85T2E-M panel antennas **Install:** (3) P65-15XL-2 panel antennas (3) MG D3-800T0 panel antennas (3) FD9R6004/2C-3L Diplexers (3) 1-5/8" dia. coaxial cable	**Verizon Wireless (Proposed)**	**@ 144'**

The results of the analysis indicate that the modified tower superstructure steel stresses are within the allowable limits. The tower foundation meets the minimum safety factor of two required to resist overturning as stipulated by Chapter 31, Section 3108.4.2 of the 2003 International Building Code (IBC). **The required modification is to replace the existing 3/4" A-325 bolts connecting the diagonals to the legs from elevation of 0' to 40' with 3/4" A-325X bolts.** A total of 48 bolts shall be replaced (16 per sector). Therefore, the overall modified tower structure is deemed 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 and structural member sizes obtained from manufacturer's erection drawing prepared by ROHN Industries, dated September 30, 1996.
3) Foundation geometry obtained from manufacturer's foundation design drawings prepared by ROHN Industries, dated September 30, 1996.
4) Previous structural evaluation prepared by Malouf Engineering Intl., INC., on behalf of AT&T, dated September 21, 2007.
5) Previous structural analysis performed by URS Corporation on behalf of Pocket Wireless, project number PWS-004 / 36923534, signed and sealed September 30. 2008.
6) Previous structural assessment prepared by Velocitel on behalf of T-Mobile, project number 206AEATLCT11402, signed and sealed April 17, 2009.
7) Antenna and mount configuration as specified within Section 2 and 6 of this report.
8) Coax cable orientation as specified in section 6 of this report.

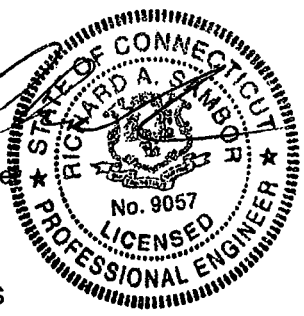
1. EXECUTIVE SUMMARY *(continued)*

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. 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/kab

cc: MJE, ICA – URS
CF/Book

2. INTRODUCTION

The subject tower is located at 232 S. Main St, East Windsor, Connecticut. The structure is an existing 188' self supporting steel tapered lattice tower, designed and manufactured by ROHN Industries.

The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(1) Antel BCD-8701010 Omni-Directional Antenna	Unknown (existing)	Leg Mount	193.5'	(1) 7/8"
(9) RR90-17-D2Dp Panels	Nextel (existing)	13' Platform	188'	(9) 1-5/8"
(3) RFS APXV18-206517S-C	Pocket Wireless (existing)	Leg Mount	177'	(6) 1-5/8"
(6) CSS DU01417-8686 Panel Antennas (6) TMA's (3) 7770 Panel Antennas (3) LGP 13519 Diplexers (1) Powerwave 7060 CILOC (3) Powerwave 7020 RCU/RET's	AT&T (existing)	(3) 15' Sector Mounts	168'	(9) 1-5/8" (3) 1-1/4" (1) 3/8"
(3) RFS APX16DWV-16DWVS panel antennas (6) EMS RR90-17-02DP panel antennas (3) Twin TMAs (6) TMAs	T-Mobile (existing)	(3) 12' Sector Mounts	153'	(18) 1-1/4"
(6) WPA-80090/4CF	Verizon (existing)	(3) 15' Sector Mounts	144'	(12) 1-5/8"
(3) P65-15XL-2 panel antennas (3) MG D3-800T0 panel antennas (3) FD9R6004/2C-3L Diplexers	**Verizon (proposed)**	**Same as Above**		**(3) 1-5/8"**
(6) DB980H90 Panels	Sprint (existing)	(3) 12' Sector Mounts	124'	(6) 1-5/8"

This structural analysis of the communications tower was performed by URS Corporation (URS) for Verizon Wireless. The purpose of this analysis was to investigate the structural integrity of the modified 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 2005 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 Connecticut State Building Code requires a three second gust wind speed of 95 mph which converts to a 77.5 mph fastest mile per 2003 IBC (Table 1609.3.1). The TIA/EIA-222-F requires a basic wind speed of 80 mph fastest mile. In this case the wind speed from the TIA/EIA-222-F governs the design.

The analysis was conducted using RISA Tower 5.0.2. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Load Condition 1 = 80 mph (fastest mile) Wind Load + Tower Dead Load
Load Condition 2 = 69 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

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 were evaluated to compare with allowable stresses in accordance with AISC. The results of the analysis indicate that the calculated stresses under the proposed loading were below the allowable stresses for the modified tower superstructure (see table below). **The required modification is to replace the existing 3/4" A-325 bolts connecting the diagonals to the legs from elevation of 0' to 40' with 3/4" A-325X bolts.** A total of 48 bolts shall be replaced (16 per sector). In addition, the tower foundation meets the minimum safety factor of two required to resist overturning as stipulated by Chapter 31, Section 3108.4.2 of the 2003 International Building Code (IBC). Detailed analysis and calculations for the proposed load condition are provided in section 6 of this report. The tower anchor bolts were found to be structurally adequate.

Tower Base reactions:
For detailed proposed tower reactions, see drawing no. E-1 in section 6 of this report.

Tower Component Stress vs. Capacity Summary:

Component / (Section No.)	Controlling Component/ Elevation	Stress (% capacity)	Pass/Fail	Comments:
Tower Leg (T6)	Compression/80'-100'	63.9%	Pass	
Diagonal (T10)	Compression/0'-20'	90.6%	Pass	
Top Girt (T1)	Compression/180'-188'	2.5%	Pass	
Anchor Bolts	Tension	48.0%	Pass	

Foundation Summary:

Foundation	Component	Stress (% capacity/FOS)	Pass/Fail	Comments:
Reinf. Concrete Pad	OTM	92.2%/2.17	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 modified tower superstructure steel stresses are within the allowable limits. See Section 1 for proposed modifications. Also, the tower foundation meets the minimum safety factor of two required to resist overturning as stipulated by Chapter 31, Section 3108.4.2 of the 2003 International Building Code (IBC). Therefore, the overall tower structure is deemed 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.

URS is not responsible for any modifications completed prior to or hereafter in which URS is not or was not directly involved. Modifications include but are not limited to:

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

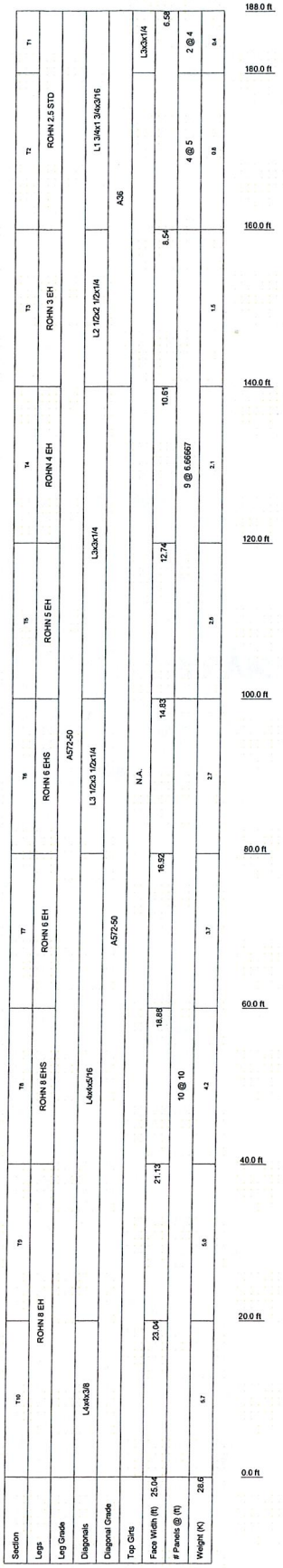
URS hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon information contained and set forth herein. If you are aware of 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.

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 condition.

6. DRAWINGS AND DATA

RISA TOWER INPUT / OUTPUT SUMMARY



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
BCD-87010__ (Unknown)	193.5	Twin TMA (T-Mobile)	153
(3) RR90-17-02DP w/Mount Pipe (Nextel)	188	RR90-17-02DP w/Mount Pipe (T-Mobile)	153
(3) RR90-17-02DP w/Mount Pipe (Nextel)	188	RR90-17-02DP w/Mount Pipe (T-Mobile)	153
(3) RR90-17-02DP w/Mount Pipe (Nextel)	188	RR90-17-02DP w/Mount Pipe (T-Mobile)	153
Pirod 15' Low Profile Platform (Nextel)	188	RR90-17-02DP w/Mount Pipe (T-Mobile)	153
APXV18-206517S-C w/ mounting hardware (Pocket Wireless)	177	RR90-17-02DP w/Mount Pipe (T-Mobile)	153
APXV18-206517S-C w/ mounting hardware (Pocket Wireless)	177	RR90-17-02DP w/Mount Pipe (T-Mobile)	153
APXV18-206517S-C w/ mounting hardware (Pocket Wireless)	177	(2) TMA (T-Mobile)	153
7770 Panel Antenna (ATI)	168	(2) TMA (T-Mobile)	153
7770 Panel Antenna (ATI)	168	(2) TMA (T-Mobile)	153
7770 Panel Antenna (ATI)	168	Rohn 12 Foot Sector Frame (T-Mobile)	153
LGP 13519 Diplexer (ATI)	168	Rohn 12 Foot Sector Frame (T-Mobile)	153
LGP 13519 Diplexer (ATI)	168	Rohn 12 Foot Sector Frame (T-Mobile)	153
LGP 13519 Diplexer (ATI)	168	WPA-80090/4CF (Verizon)	144
7060 CILOC (ATI)	168	WPA-80090/4CF (Verizon)	144
7020 RCU/RETs (ATI)	168	WPA-80090/4CF (Verizon)	144
7020 RCU/RETs (ATI)	168	WPA-80090/4CF (Verizon)	144
7020 RCU/RETs (ATI)	168	WPA-80090/4CF (Verizon)	144
(2) LGP214nn TMA (ATI)	168	WPA-80090/4CF (Verizon)	144
(2) LGP214nn TMA (ATI)	168	Rymsa MG D3-800Tx (Verizon)	144
(2) LGP214nn TMA (ATI)	168	Rymsa MG D3-800Tx (Verizon)	144
(2) DUO1417-8686 w/Mount Pipe (ATI)	168	Rymsa MG D3-800Tx (Verizon)	144
(2) DUO1417-8686 w/Mount Pipe (ATI)	168	P65-15-XL-2 (Verizon)	144
(2) DUO1417-8686 w/Mount Pipe (ATI)	168	P65-15-XL-2 (Verizon)	144
Rohn 15 Foot Sector Frame (ATI)	168	P65-15-XL-2 (Verizon)	144
Rohn 15 Foot Sector Frame (ATI)	168	Rohn 15 Foot Sector Frame (Verizon)	144
Rohn 15 Foot Sector Frame (ATI)	168	Rohn 15 Foot Sector Frame (Verizon)	144
APX16DWV-16DWV-S-E-ACU w/ Mount (T-Mobile)	153	Rohn 15 Foot Sector Frame (Verizon)	144
APX16DWV-16DWV-S-E-ACU w/ Mount (T-Mobile)	153	FD9R6004/2C-3L Diplexer (Verizon)	144
APX16DWV-16DWV-S-E-ACU w/ Mount (T-Mobile)	153	FD9R6004/2C-3L Diplexer (Verizon)	144
Twin TMA (T-Mobile)	153	FD9R6004/2C-3L Diplexer (Verizon)	144
Twin TMA (T-Mobile)	153	Rohn 12 Foot Sector Frame (Sprint)	124
		Rohn 12 Foot Sector Frame (Sprint)	124
		Rohn 12 Foot Sector Frame (Sprint)	124
		(2) DB980H90E-M w/Mount Pipe (Sprint)	124
		(2) DB980H90E-M w/Mount Pipe (Sprint)	124
		(2) DB980H90E-M w/Mount Pipe (Sprint)	124

MATERIAL STRENGTH

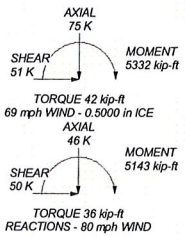
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 60 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: 90.6%

△

MAX. CORNER REACTIONS AT BASE:
DOWN: 271 K
UPLIFT: -216 K
SHEAR: 33 K



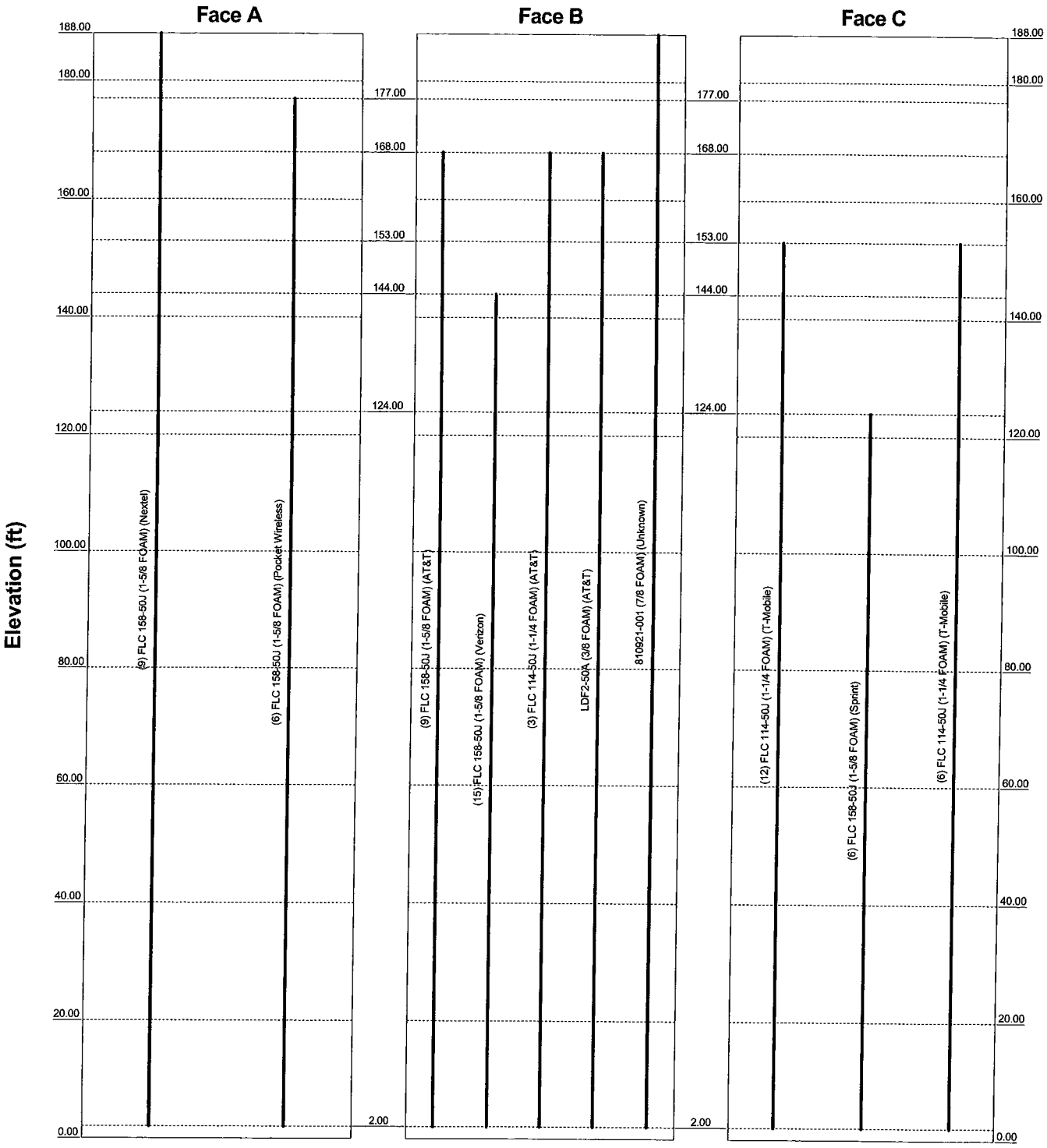
URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: (860) 529-8882
FAX: (860) 529-3991

Job:	*188' SSV Rohn Tower*
Project:	*232 S. Main St, East Windsor, CT*
Client: Verizon Wireless	Drawn by: Kevin Barker / App'd:
Code: TIA/EIA-222-F	Date: 11/18/10 / Scale: NTS
Path: P:\GERI Files\188 SSV Rohn Tower.eri	Dwg No. E-1

RISA TOWER FEEDLINE DISTRIBUTION CHART

Feedline Distribution Chart
0' - 188'

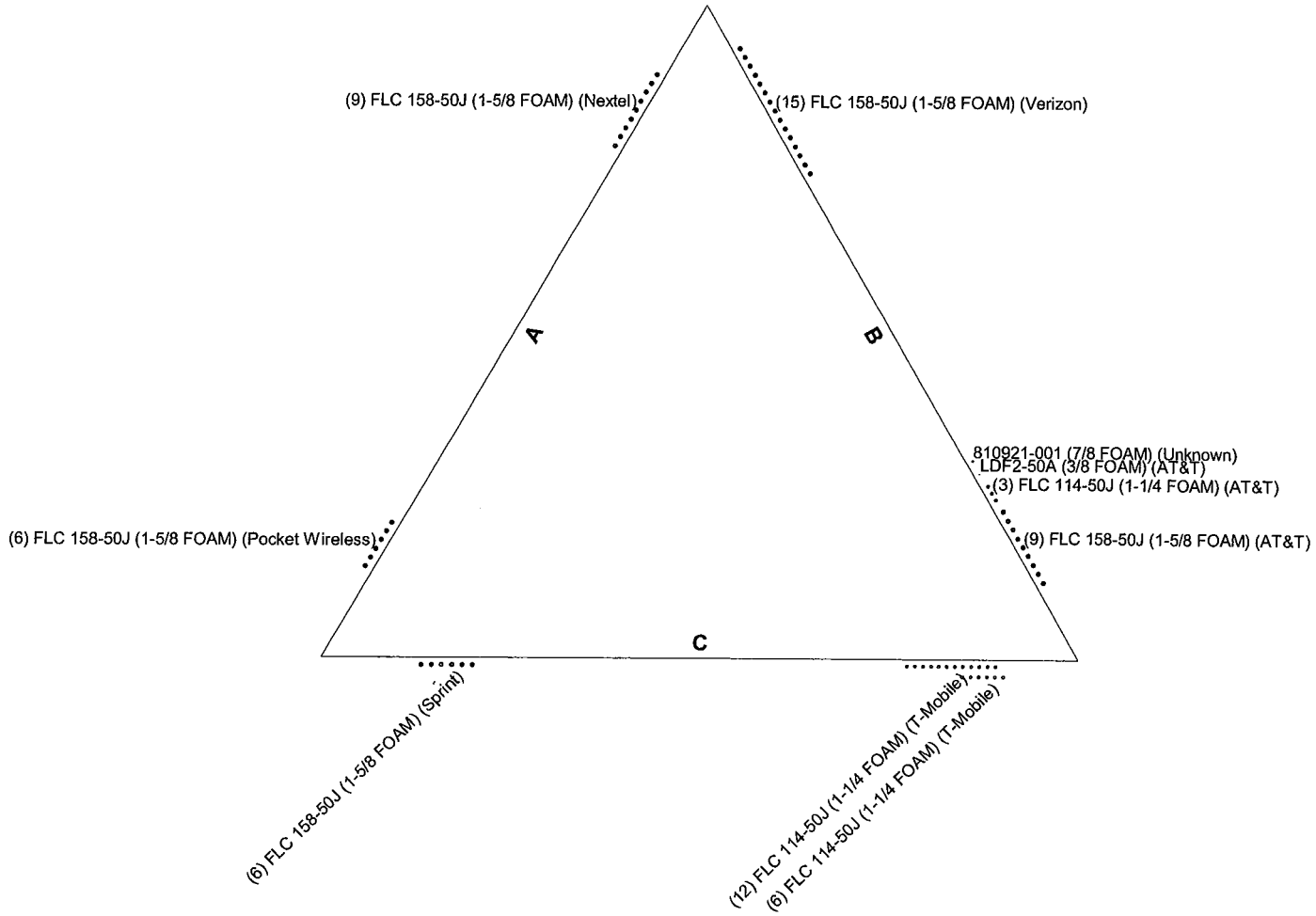
Round — Flat - - - - - - App In Face — - — App Out Face — - - — Truss Leg



URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job: ***188' SSV Rohn Tower***		
	Project: ***232 S. Main St, East Windsor, CT***		
	Client: Verizon Wireless	Drawn by: Kevin Barker	App'd:
	Code: TIA/EIA-222-F	Date: 11/18/10	Scale: NTS
	Path: P:\08\ERI Files\188 SSV Rohn Tower.eri		Dwg No. E-7

RISA TOWER FEEDLINE PLAN

Feedline Plan



URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: (860) 529-8882
FAX: (860) 529-3991

Job: ***188' SSV Rohn Tower***			
Project: ***232 S. Main St, East Windsor, CT***			
Client: Verizon Wireless	Drawn by: Kevin Barker	App'd:	
Code: TIA/EIA-222-F	Date: 11/18/10	Scale: NTS	
Path: P:\08\ERI Files\188 SSV Rohn Tower.eri		Dwg No. E-7	

RISA TOWER DETAILED OUTPUT

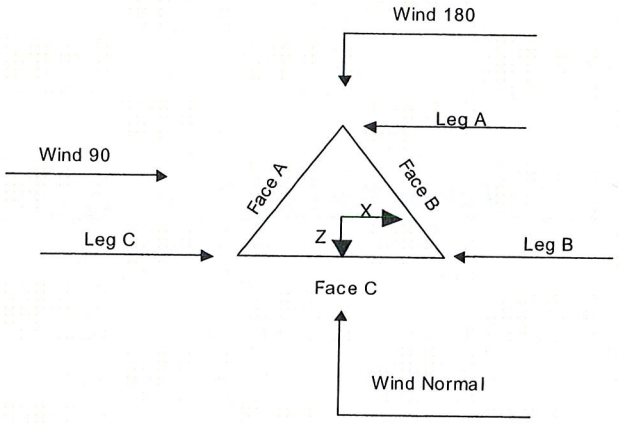
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 188.00 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 6.58 ft at the top and 25.04 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 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

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	188.00-180.00			6.58	1	8.00
T2	180.00-160.00			6.58	1	20.00
T3	160.00-140.00			8.54	1	20.00
T4	140.00-120.00			10.61	1	20.00
T5	120.00-100.00			12.74	1	20.00
T6	100.00-80.00			14.83	1	20.00
T7	80.00-60.00			16.92	1	20.00
T8	60.00-40.00			18.88	1	20.00
T9	40.00-20.00			21.13	1	20.00
T10	20.00-0.00			23.04	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	188.00-180.00	4.00	X Brace	No	No	0.0000	0.0000
T2	180.00-160.00	5.00	X Brace	No	No	0.0000	0.0000
T3	160.00-140.00	6.67	X Brace	No	No	0.0000	0.0000
T4	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T5	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000

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	100.00-80.00	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 188.00-180.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 180.00-160.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T3 160.00-140.00	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T4 140.00-120.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 ksi)
T5 120.00-100.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 ksi)
T6 100.00-80.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T7 80.00-60.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T8 60.00-40.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T9 40.00-20.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T10 20.00-0.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Single Angle	L4x4x3/8	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 188.00-180.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 80.00-60.00	0.00	0.0000	A36	1	1	1	36.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T8 60.00-40.00	0.00	0.0000	(36 ksi) A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 40.00-20.00	0.00	0.0000	(36 ksi) A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 20.00-0.00	0.00	0.0000	(36 ksi) A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors[1] X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 188.00-180.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 180.00-160.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 160.00-140.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T10 20.00-0.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

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

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 188.00-180.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

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 180.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

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 188.00-180.00	Flange	0.6250 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 180.00-160.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 160.00-140.00	Flange	0.8750 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 140.00-120.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 120.00-100.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 100.00-80.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 80.00-60.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 60.00-40.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 40.00-20.00	Flange	1.0000 A325N	8	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 20.00-0.00	Flange	1.0000 A325N	10	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf

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
FLC 158-50J (1-5/8 FOAM) (Nextel)	A	No	Ar (CfAe)	188.00 - 2.00	2.0000	0.3333	9	9	2.0200	2.0200		0.92
FLC 158-50J (1-5/8 FOAM) (AT&T)	B	No	Ar (CfAe)	168.00 - 2.00	2.0000	0.3333	9	9	2.0200	2.0200		0.92
FLC 114-50J (1-1/4 FOAM) (T-Mobile)	C	No	Ar (CfAe)	153.00 - 2.00	2.0000	-0.3333	12	12	1.5800	1.5800		0.70
FLC 158-50J (1-5/8 FOAM) (Verizon)	B	No	Ar (CfAe)	144.00 - 2.00	2.0000	-0.3333	15	15	2.0200	2.0200		0.92
FLC 158-50J (1-5/8 FOAM) (Sprint)	C	No	Ar (CfAe)	124.00 - 2.00	2.0000	0.3333	6	6	2.0200	2.0200		0.92
FLC 114-50J (1-1/4 FOAM) (AT&T)	B	No	Ar (CfAe)	168.00 - 2.00	2.0000	0.25	3	3	1.5800	1.5800		0.70
LDF2-50A (3/8 FOAM) (AT&T)	B	No	Ar (CfAe)	168.00 - 2.00	2.0000	0.22	1	1	0.4400	0.4400		0.08
FLC 158-50J (1-5/8 FOAM) (Pocket Wireless)	A	No	Ar (CfAe)	177.00 - 2.00	2.0000	-0.3333	6	6	2.0200	2.0200		0.92
810921-001 (7/8 FOAM) (Unknown)	B	No	Ar (CfAe)	188.00 - 2.00	2.0000	0.2	1	1	1.1100	1.1100		0.40
FLC 114-50J (1-1/4 FOAM) (T-Mobile)	C	No	Ar (CfAe)	153.00 - 2.00	6.0000	-0.375	6	6	1.5800	1.5800		0.70

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	188.00-180.00	A	12.120	0.000	0.000	0.000	0.07
		B	0.740	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	180.00-160.00	A	47.470	0.000	0.000	0.000	0.26
		B	17.423	0.000	0.000	0.000	0.09
		C	0.000	0.000	0.000	0.000	0.00
T3	160.00-140.00	A	50.500	0.000	0.000	0.000	0.28
		B	50.883	0.000	0.000	0.000	0.27
		C	30.810	0.000	0.000	0.000	0.16
T4	140.00-120.00	A	50.500	0.000	0.000	0.000	0.28
		B	91.283	0.000	0.000	0.000	0.49
		C	51.440	0.000	0.000	0.000	0.27
T5	120.00-100.00	A	50.500	0.000	0.000	0.000	0.28
		B	91.283	0.000	0.000	0.000	0.49
		C	67.600	0.000	0.000	0.000	0.36
T6	100.00-80.00	A	50.500	0.000	0.000	0.000	0.28
		B	91.283	0.000	0.000	0.000	0.49
		C	67.600	0.000	0.000	0.000	0.36
T7	80.00-60.00	A	50.500	0.000	0.000	0.000	0.28
		B	91.283	0.000	0.000	0.000	0.49

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	67.600	0.000	0.000	0.000	0.36
T8	60.00-40.00	A	50.500	0.000	0.000	0.000	0.28
		B	91.283	0.000	0.000	0.000	0.49
		C	67.600	0.000	0.000	0.000	0.36
T9	40.00-20.00	A	50.500	0.000	0.000	0.000	0.28
		B	91.283	0.000	0.000	0.000	0.49
		C	67.600	0.000	0.000	0.000	0.36
T10	20.00-0.00	A	45.450	0.000	0.000	0.000	0.25
		B	82.155	0.000	0.000	0.000	0.44
		C	60.840	0.000	0.000	0.000	0.33

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	188.00-180.00	A	0.500	18.120	0.000	0.000	0.000	0.18
		B		1.407	0.000	0.000	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T2	180.00-160.00	A	0.500	70.970	0.000	0.000	0.000	0.69
		B		27.757	0.000	0.000	0.000	0.26
		C		0.000	0.000	0.000	0.000	0.00
T3	160.00-140.00	A	0.500	75.500	0.000	0.000	0.000	0.74
		B		79.217	0.000	0.000	0.000	0.75
		C		50.310	0.000	0.000	0.000	0.46
T4	140.00-120.00	A	0.500	75.500	0.000	0.000	0.000	0.74
		B		139.617	0.000	0.000	0.000	1.34
		C		83.440	0.000	0.000	0.000	0.77
T5	120.00-100.00	A	0.500	75.500	0.000	0.000	0.000	0.74
		B		139.617	0.000	0.000	0.000	1.34
		C		107.600	0.000	0.000	0.000	1.00
T6	100.00-80.00	A	0.500	75.500	0.000	0.000	0.000	0.74
		B		139.617	0.000	0.000	0.000	1.34
		C		107.600	0.000	0.000	0.000	1.00
T7	80.00-60.00	A	0.500	75.500	0.000	0.000	0.000	0.74
		B		139.617	0.000	0.000	0.000	1.34
		C		107.600	0.000	0.000	0.000	1.00
T8	60.00-40.00	A	0.500	75.500	0.000	0.000	0.000	0.74
		B		139.617	0.000	0.000	0.000	1.34
		C		107.600	0.000	0.000	0.000	1.00
T9	40.00-20.00	A	0.500	75.500	0.000	0.000	0.000	0.74
		B		139.617	0.000	0.000	0.000	1.34
		C		107.600	0.000	0.000	0.000	1.00
T10	20.00-0.00	A	0.500	67.950	0.000	0.000	0.000	0.66
		B		125.655	0.000	0.000	0.000	1.21
		C		96.840	0.000	0.000	0.000	0.90

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	188.00-180.00	-2.1204	-10.2579	-2.0155	-10.4473
T2	180.00-160.00	-2.3460	-6.8983	-2.0153	-6.8769

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T3	160.00-140.00	9.6188	-0.4951	10.7560	0.0743
T4	140.00-120.00	12.0388	-5.7254	13.4981	-5.1685
T5	120.00-100.00	10.0294	-3.6181	11.6175	-3.0021
T6	100.00-80.00	11.2500	-4.0950	13.2342	-3.4613
T7	80.00-60.00	12.0768	-4.4254	14.3503	-3.7869
T8	60.00-40.00	12.5109	-4.6098	15.1267	-4.0213
T9	40.00-20.00	13.5243	-5.0053	16.3828	-4.3808
T10	20.00-0.00	13.6546	-5.0701	16.6829	-4.4806

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BCD-87010__ (Unknown)	C	From Leg	0.25 0.00 0.00	0.0000	193.50	No Ice 1/2" Ice	1.92 2.68	1.92 2.68	0.03 0.04
(3) RR90-17-02DP w/Mount Pipe (Nextel)	A	From Leg	3.71 0.00 0.00	30.0000	188.00	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
(3) RR90-17-02DP w/Mount Pipe (Nextel)	B	From Leg	3.71 0.00 0.00	30.0000	188.00	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
(3) RR90-17-02DP w/Mount Pipe (Nextel)	C	From Leg	3.71 0.00 0.00	30.0000	188.00	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
Pirod 15' Low Profile Platform (Nextel)	C	None		0.0000	188.00	No Ice 1/2" Ice	24.90 30.70	24.90 30.70	1.81 2.35
APXV18-206517S-C w/ mounting hardware (Pocket Wireless)	A	From Leg	1.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
APXV18-206517S-C w/ mounting hardware (Pocket Wireless)	B	From Leg	1.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
APXV18-206517S-C w/ mounting hardware (Pocket Wireless)	C	From Leg	1.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
7770 Panel Antenna (AT&T)	A	Stand-Off Left	6.50 3.75 0.00	30.0000	168.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
7770 Panel Antenna (AT&T)	B	Stand-Off Left	6.50 3.75 0.00	30.0000	168.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
7770 Panel Antenna (AT&T)	C	Stand-Off Left	6.50 3.75 0.00	30.0000	168.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
LGP 13519 Diplexer (AT&T)	A	Stand-Off Left	6.50 3.75 0.00	30.0000	168.00	No Ice 1/2" Ice	0.27 0.34	0.13 0.18	0.01 0.01
LGP 13519 Diplexer (AT&T)	B	Stand-Off Left	6.50 3.75	30.0000	168.00	No Ice 1/2" Ice	0.27 0.34	0.13 0.18	0.01 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
LGP 13519 Diplexer	C	Stand-Off	6.50	30.0000	168.00	No Ice	0.27	0.13	0.01
(AT&T)		Left	3.75			1/2" Ice	0.34	0.18	0.01
			0.00						
7060 CILOC	A	Stand-Off	6.50	30.0000	168.00	No Ice	0.07	0.06	0.00
(AT&T)		Left	3.75			1/2" Ice	0.11	0.09	0.00
			0.00						
7020 RCU/RETs	A	Stand-Off	6.50	30.0000	168.00	No Ice	0.40	0.12	0.00
(AT&T)		Left	3.75			1/2" Ice	0.49	0.17	0.01
			0.00						
7020 RCU/RETs	B	Stand-Off	6.50	30.0000	168.00	No Ice	0.40	0.12	0.00
(AT&T)		Left	3.75			1/2" Ice	0.49	0.17	0.01
			0.00						
7020 RCU/RETs	C	Stand-Off	6.50	30.0000	168.00	No Ice	0.40	0.12	0.00
(AT&T)		Left	3.75			1/2" Ice	0.49	0.17	0.01
			0.00						
(2) LGP214nn TMA	A	Stand-Off	6.50	30.0000	168.00	No Ice	1.29	0.23	0.00
(AT&T)		Left	3.75			1/2" Ice	1.45	0.31	0.01
			0.00						
(2) LGP214nn TMA	B	Stand-Off	6.50	30.0000	168.00	No Ice	1.29	0.23	0.00
(AT&T)		Left	3.75			1/2" Ice	1.45	0.31	0.01
			0.00						
(2) LGP214nn TMA	C	Stand-Off	6.50	30.0000	168.00	No Ice	1.29	0.23	0.00
(AT&T)		Left	3.75			1/2" Ice	1.45	0.31	0.01
			0.00						
(2) DUO1417-8686 w/Mount	A	Stand-Off	6.50	30.0000	168.00	No Ice	7.25	5.86	0.05
Pipe		Left	3.75			1/2" Ice	7.96	6.96	0.10
(AT&T)			0.00						
(2) DUO1417-8686 w/Mount	B	Stand-Off	6.50	30.0000	168.00	No Ice	7.25	5.86	0.05
Pipe		Left	3.75			1/2" Ice	7.96	6.96	0.10
(AT&T)			0.00						
(2) DUO1417-8686 w/Mount	C	Stand-Off	6.50	30.0000	168.00	No Ice	7.25	5.86	0.05
Pipe		Left	3.75			1/2" Ice	7.96	6.96	0.10
(AT&T)			0.00						
Rohn 15 Foot Sector Frame	A	Stand-Off	6.50	30.0000	168.00	No Ice	13.90	3.08	0.39
(AT&T)		Left	3.75			1/2" Ice	20.00	5.13	0.53
			0.00						
Rohn 15 Foot Sector Frame	B	Stand-Off	6.50	30.0000	168.00	No Ice	13.90	3.08	0.39
(AT&T)		Left	3.75			1/2" Ice	20.00	5.13	0.53
			0.00						
Rohn 15 Foot Sector Frame	C	Stand-Off	6.50	30.0000	168.00	No Ice	13.90	3.08	0.39
(AT&T)		Left	3.75			1/2" Ice	20.00	5.13	0.53
			0.00						
APX16DWV-16DWV-S-E-	A	Stand-Off	5.20	30.0000	153.00	No Ice	6.70	3.27	0.07
ACU w/ Mount		Left	3.00			1/2" Ice	7.13	3.86	0.12
(T-Mobile)			0.00						
APX16DWV-16DWV-S-E-	B	Stand-Off	5.20	30.0000	153.00	No Ice	6.70	3.27	0.07
ACU w/ Mount		Left	3.00			1/2" Ice	7.13	3.86	0.12
(T-Mobile)			0.00						
APX16DWV-16DWV-S-E-	C	Stand-Off	5.20	30.0000	153.00	No Ice	6.70	3.27	0.07
ACU w/ Mount		Left	3.00			1/2" Ice	7.13	3.86	0.12
(T-Mobile)			0.00						
Twin TMA	A	Stand-Off	5.20	30.0000	153.00	No Ice	0.67	0.37	0.01
(T-Mobile)		Left	3.00			1/2" Ice	0.78	0.46	0.02
			0.00						
Twin TMA	B	Stand-Off	5.20	30.0000	153.00	No Ice	0.67	0.37	0.01
(T-Mobile)		Left	3.00			1/2" Ice	0.78	0.46	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
Twin TMA (T-Mobile)	C	Stand-Off Left	5.20 3.00 0.00	30.0000	153.00	No Ice 1/2" Ice	0.67 0.78	0.37 0.46	0.01 0.02
RR90-17-02DP w/Mount Pipe (T-Mobile)	A	Stand-Off Left	3.50 2.00 0.00	0.0000	153.00	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
RR90-17-02DP w/Mount Pipe (T-Mobile)	A	Stand-Off Left	6.90 4.00 0.00	0.0000	153.00	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
RR90-17-02DP w/Mount Pipe (T-Mobile)	B	Stand-Off Left	3.50 2.00 0.00	0.0000	153.00	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
RR90-17-02DP w/Mount Pipe (T-Mobile)	B	Stand-Off Left	6.90 4.00 0.00	0.0000	153.00	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
RR90-17-02DP w/Mount Pipe (T-Mobile)	C	Stand-Off Left	3.50 2.00 0.00	0.0000	153.00	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
RR90-17-02DP w/Mount Pipe (T-Mobile)	C	Stand-Off Left	6.90 4.00 0.00	0.0000	153.00	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
(2) TMA (T-Mobile)	A	Stand-Off Left	5.20 3.00 0.00	0.0000	153.00	No Ice 1/2" Ice	2.18 2.38	0.37 0.49	0.02 0.03
(2) TMA (T-Mobile)	B	Stand-Off Left	5.20 3.00 0.00	0.0000	153.00	No Ice 1/2" Ice	2.18 2.38	0.37 0.49	0.02 0.03
(2) TMA (T-Mobile)	C	Stand-Off Left	5.20 3.00 0.00	0.0000	153.00	No Ice 1/2" Ice	2.18 2.38	0.37 0.49	0.02 0.03
Rohn 12 Foot Sector Frame (T-Mobile)	A	Stand-Off Left	5.20 3.00 0.00	30.0000	153.00	No Ice 1/2" Ice	12.20 17.60	3.08 5.13	0.36 0.49
Rohn 12 Foot Sector Frame (T-Mobile)	B	Stand-Off Left	5.20 3.00 0.00	30.0000	153.00	No Ice 1/2" Ice	12.20 17.60	3.08 5.13	0.36 0.49
Rohn 12 Foot Sector Frame (T-Mobile)	C	Stand-Off Left	5.20 3.00 0.00	30.0000	153.00	No Ice 1/2" Ice	12.20 17.60	3.08 5.13	0.36 0.49
WPA-80090/4CF (Verizon)	A	Stand-Off Left	1.30 0.75 0.00	30.0000	144.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	0.01 0.04
WPA-80090/4CF (Verizon)	B	Stand-Off Left	1.30 0.75 0.00	30.0000	144.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	0.01 0.04
WPA-80090/4CF (Verizon)	C	Stand-Off Left	1.30 0.75 0.00	30.0000	144.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	0.01 0.04
WPA-80090/4CF (Verizon)	A	Stand-Off Left	11.69 6.75 0.00	30.0000	144.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	0.01 0.04
WPA-80090/4CF (Verizon)	B	Stand-Off Left	11.69 6.75 0.00	30.0000	144.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	0.01 0.04
WPA-80090/4CF (Verizon)	C	Stand-Off Left	11.69 6.75	30.0000	144.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	0.01 0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
Rymsa MG D3-800Tx	A	Stand-Off	3.03	30.0000	144.00	No Ice	3.57	3.43	0.03
(Verizon)		Left	1.75			1/2" Ice	3.94	4.07	0.06
			0.00						
Rymsa MG D3-800Tx	B	Stand-Off	3.03	30.0000	144.00	No Ice	3.57	3.43	0.03
(Verizon)		Left	1.75			1/2" Ice	3.94	4.07	0.06
			0.00						
Rymsa MG D3-800Tx	C	Stand-Off	3.03	30.0000	144.00	No Ice	3.57	3.43	0.03
(Verizon)		Left	1.75			1/2" Ice	3.94	4.07	0.06
			0.00						
P65-15-XL-2	A	Stand-Off	9.95	30.0000	144.00	No Ice	8.54	5.99	0.07
(Verizon)		Left	5.75			1/2" Ice	9.13	6.89	0.13
			0.00						
P65-15-XL-2	B	Stand-Off	9.95	30.0000	144.00	No Ice	8.54	5.99	0.07
(Verizon)		Left	5.75			1/2" Ice	9.13	6.89	0.13
			0.00						
P65-15-XL-2	C	Stand-Off	9.95	30.0000	144.00	No Ice	8.54	5.99	0.07
(Verizon)		Left	5.75			1/2" Ice	9.13	6.89	0.13
			0.00						
Rohn 15 Foot Sector Frame	A	Stand-Off	6.50	30.0000	144.00	No Ice	13.90	3.08	0.39
(Verizon)		Left	3.75			1/2" Ice	20.00	5.13	0.53
			0.00						
Rohn 15 Foot Sector Frame	B	Stand-Off	6.50	30.0000	144.00	No Ice	13.90	3.08	0.39
(Verizon)		Left	3.75			1/2" Ice	20.00	5.13	0.53
			0.00						
Rohn 15 Foot Sector Frame	C	Stand-Off	6.50	30.0000	144.00	No Ice	13.90	3.08	0.39
(Verizon)		Left	3.75			1/2" Ice	20.00	5.13	0.53
			0.00						
(2) DB980H90E-M w/Mount	A	Stand-Off	4.33	30.0000	124.00	No Ice	4.27	3.86	0.03
Pipe		Left	2.50			1/2" Ice	4.86	4.95	0.07
(Sprint)			0.00						
(2) DB980H90E-M w/Mount	B	Stand-Off	4.33	30.0000	124.00	No Ice	4.27	3.86	0.03
Pipe		Left	2.50			1/2" Ice	4.86	4.95	0.07
(Sprint)			0.00						
(2) DB980H90E-M w/Mount	C	Stand-Off	4.33	30.0000	124.00	No Ice	4.27	3.86	0.03
Pipe		Left	2.50			1/2" Ice	4.86	4.95	0.07
(Sprint)			0.00						
Rohn 12 Foot Sector Frame	A	Stand-Off	4.33	30.0000	124.00	No Ice	12.20	3.08	0.36
(Sprint)		Left	2.50			1/2" Ice	17.60	5.13	0.49
			0.00						
Rohn 12 Foot Sector Frame	B	Stand-Off	4.33	30.0000	124.00	No Ice	12.20	3.08	0.36
(Sprint)		Left	2.50			1/2" Ice	17.60	5.13	0.49
			0.00						
Rohn 12 Foot Sector Frame	C	Stand-Off	4.33	30.0000	124.00	No Ice	12.20	3.08	0.36
(Sprint)		Left	2.50			1/2" Ice	17.60	5.13	0.49
			0.00						
FD9R6004/2C-3L Diplexer	A	Stand-Off	4.00	0.0000	144.00	No Ice	0.37	0.08	0.00
(Verizon)		Left	4.00			1/2" Ice	0.45	0.14	0.00
			0.00						
FD9R6004/2C-3L Diplexer	B	Stand-Off	4.00	0.0000	144.00	No Ice	0.37	0.08	0.00
(Verizon)		Left	4.00			1/2" Ice	0.45	0.14	0.00
			0.00						
FD9R6004/2C-3L Diplexer	C	Stand-Off	4.00	0.0000	144.00	No Ice	0.37	0.08	0.00
(Verizon)		Left	4.00			1/2" Ice	0.45	0.14	0.00
			0.00						

Tower Pressures - No Ice

$G_H = 1.118$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 188.00-180.00	184.00	1.634	27	54.557	A	5.913	15.953	3.833	17.53	0.000	0.000
					B	5.913	4.573		36.55	0.000	0.000
					C	5.913	3.833		39.33	0.000	0.000
T2 180.00-160.00	170.00	1.597	26	155.997	A	10.246	57.069	9.599	14.26	0.000	0.000
					B	10.246	27.022		25.76	0.000	0.000
					C	10.246	9.599		48.37	0.000	0.000
T3 160.00-140.00	150.00	1.541	25	197.341	A	14.160	62.187	11.687	15.31	0.000	0.000
					B	14.160	62.571		15.23	0.000	0.000
					C	14.160	42.497		20.63	0.000	0.000
T4 140.00-120.00	130.00	1.48	24	241.011	A	19.550	65.528	15.028	17.66	0.000	0.000
					B	19.550	106.312		11.94	0.000	0.000
					C	19.550	66.468		17.47	0.000	0.000
T5 120.00-100.00	110.00	1.411	23	284.984	A	22.226	69.077	18.577	20.35	0.000	0.000
					B	22.226	109.860		14.06	0.000	0.000
					C	22.226	86.177		17.14	0.000	0.000
T6 100.00-80.00	90.00	1.332	22	328.557	A	21.164	72.623	22.123	23.59	0.000	0.000
					B	21.164	113.407		16.44	0.000	0.000
					C	21.164	89.723		19.95	0.000	0.000
T7 80.00-60.00	70.00	1.24	20	369.055	A	26.500	72.619	22.119	22.32	0.000	0.000
					B	26.500	113.402		15.81	0.000	0.000
					C	26.500	89.719		19.03	0.000	0.000
T8 60.00-40.00	50.00	1.126	18	414.498	A	28.816	79.311	28.811	26.65	0.000	0.000
					B	28.816	120.094		19.35	0.000	0.000
					C	28.816	96.411		23.01	0.000	0.000
T9 40.00-20.00	30.00	1	16	456.091	A	31.276	79.294	28.794	26.04	0.000	0.000
					B	31.276	120.077		19.02	0.000	0.000
					C	31.276	96.394		22.55	0.000	0.000
T10 20.00-0.00	10.00	1	16	495.193	A	33.681	74.248	28.798	26.68	0.000	0.000
					B	33.681	110.953		19.91	0.000	0.000
					C	33.681	89.638		23.35	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.118$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 188.00-180.00	184.00	1.634	20	0.5000	55.223	A	5.913	26.288	5.167	16.04	0.000	0.000
						B	5.913	9.575		33.36	0.000	0.000
						C	5.913	8.168		36.69	0.000	0.000
T2 180.00-160.00	170.00	1.597	20	0.5000	157.666	A	10.246	89.762	12.937	12.94	0.000	0.000
						B	10.246	46.549		22.78	0.000	0.000
						C	10.246	18.792		44.55	0.000	0.000
T3 160.00-140.00	150.00	1.541	19	0.5000	199.010	A	14.160	96.191	15.027	13.62	0.000	0.000
						B	14.160	99.908		13.17	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	14.160	71.001		17.65	0.000	0.000
T4 140.00-120.00	130.00	1.48	18	0.5000	242.680	A	19.550	100.384	18.368	15.32	0.000	0.000
						B	19.550	164.501		9.98	0.000	0.000
						C	19.550	108.324		14.36	0.000	0.000
T5 120.00-100.00	110.00	1.411	17	0.5000	286.653	A	22.226	104.825	21.916	17.25	0.000	0.000
						B	22.226	168.942		11.46	0.000	0.000
						C	22.226	136.925		13.77	0.000	0.000
T6 100.00-80.00	90.00	1.332	16	0.5000	330.226	A	21.164	107.010	25.463	19.87	0.000	0.000
						B	21.164	171.126		13.24	0.000	0.000
						C	21.164	139.110		15.89	0.000	0.000
T7 80.00-60.00	70.00	1.24	15	0.5000	370.724	A	26.500	107.582	25.457	18.99	0.000	0.000
						B	26.500	171.699		12.84	0.000	0.000
						C	26.500	139.682		15.32	0.000	0.000
T8 60.00-40.00	50.00	1.126	14	0.5000	416.167	A	28.816	114.855	32.151	22.38	0.000	0.000
						B	28.816	178.972		15.47	0.000	0.000
						C	28.816	146.955		18.29	0.000	0.000
T9 40.00-20.00	30.00	1	12	0.5000	457.760	A	31.276	115.451	32.132	21.90	0.000	0.000
						B	31.276	179.568		15.24	0.000	0.000
						C	31.276	147.551		17.97	0.000	0.000
T10 20.00-0.00	10.00	1	12	0.5000	496.862	A	33.681	108.507	32.137	22.60	0.000	0.000
						B	33.681	166.212		16.08	0.000	0.000
						C	33.681	137.397		18.78	0.000	0.000

Tower Pressure - Service

$G_H = 1.118$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 188.00-180.00	184.00	1.634	15	54.557	A	5.913	15.953	3.833	17.53	0.000	0.000
					B	5.913	4.573		36.55	0.000	0.000
					C	5.913	3.833		39.33	0.000	0.000
T2 180.00-160.00	170.00	1.597	15	155.997	A	10.246	57.069	9.599	14.26	0.000	0.000
					B	10.246	27.022		25.76	0.000	0.000
					C	10.246	9.599		48.37	0.000	0.000
T3 160.00-140.00	150.00	1.541	14	197.341	A	14.160	62.187	11.687	15.31	0.000	0.000
					B	14.160	62.571		15.23	0.000	0.000
					C	14.160	42.497		20.63	0.000	0.000
T4 140.00-120.00	130.00	1.48	14	241.011	A	19.550	65.528	15.028	17.66	0.000	0.000
					B	19.550	106.312		11.94	0.000	0.000
					C	19.550	66.468		17.47	0.000	0.000
T5 120.00-100.00	110.00	1.411	13	284.984	A	22.226	69.077	18.577	20.35	0.000	0.000
					B	22.226	109.860		14.06	0.000	0.000
					C	22.226	86.177		17.14	0.000	0.000
T6 100.00-80.00	90.00	1.332	12	328.557	A	21.164	72.623	22.123	23.59	0.000	0.000
					B	21.164	113.407		16.44	0.000	0.000
					C	21.164	89.723		19.95	0.000	0.000
T7 80.00-60.00	70.00	1.24	11	369.055	A	26.500	72.619	22.119	22.32	0.000	0.000
					B	26.500	113.402		15.81	0.000	0.000
					C	26.500	89.719		19.03	0.000	0.000
T8 60.00-40.00	50.00	1.126	10	414.498	A	28.816	79.311	28.811	26.65	0.000	0.000
					B	28.816	120.094		19.35	0.000	0.000
					C	28.816	96.411		23.01	0.000	0.000

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T9 40.00-20.00	30.00	1	9	456.091	A	31.276	79.294	28.794	26.04	0.000	0.000
					B	31.276	120.077		19.02	0.000	0.000
					C	31.276	96.394		22.55	0.000	0.000
T10 20.00-0.00	10.00	1	9	495.193	A	33.681	74.248	28.798	26.68	0.000	0.000
					B	33.681	110.953		19.91	0.000	0.000
					C	33.681	89.638		23.35	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K							ft^2	K	plf	
T1 188.00-180.00	0.07	0.43	A	0.401	2.062	0.652	1	1	16.314	1.01	125.87	A
			B	0.192	2.622	0.589	1	1	8.606			
			C	0.179	2.669	0.586	1	1	8.161			
T2 180.00-160.00	0.35	0.81	A	0.432	2.005	0.665	1	1	48.194	2.83	141.36	A
			B	0.239	2.471	0.599	1	1	26.435			
			C	0.127	2.857	0.578	1	1	15.796			
T3 160.00-140.00	0.71	1.47	A	0.387	2.091	0.646	1	1	54.354	3.22	160.96	B
			B	0.389	2.087	0.647	1	1	54.650			
			C	0.287	2.331	0.612	1	1	40.171			
T4 140.00-120.00	1.04	2.09	A	0.353	2.165	0.634	1	1	61.065	4.82	240.90	B
			B	0.522	1.873	0.709	1	1	94.934			
			C	0.357	2.156	0.635	1	1	61.755			
T5 120.00-100.00	1.13	2.60	A	0.32	2.243	0.622	1	1	65.216	4.89	244.30	B
			B	0.463	1.952	0.68	1	1	96.882			
			C	0.38	2.104	0.644	1	1	77.706			
T6 100.00-80.00	1.13	2.67	A	0.285	2.335	0.612	1	1	65.577	4.77	238.29	B
			B	0.41	2.045	0.656	1	1	95.508			
			C	0.337	2.201	0.628	1	1	77.518			
T7 80.00-60.00	1.13	3.73	A	0.269	2.383	0.607	1	1	70.564	4.76	237.89	B
			B	0.379	2.107	0.643	1	1	99.450			
			C	0.315	2.257	0.621	1	1	82.177			
T8 60.00-40.00	1.13	4.18	A	0.261	2.405	0.605	1	1	76.776	4.66	233.23	B
			B	0.359	2.15	0.636	1	1	105.175			
			C	0.302	2.29	0.617	1	1	88.258			
T9 40.00-20.00	1.13	4.99	A	0.242	2.46	0.6	1	1	78.850	4.32	215.94	B
			B	0.332	2.215	0.626	1	1	106.463			
			C	0.28	2.351	0.61	1	1	90.072			
T10 20.00-0.00	1.02	5.65	A	0.218	2.537	0.594	1	1	77.801	4.32	215.94	B
			B	0.292	2.317	0.614	1	1	101.751			
			C	0.249	2.44	0.602	1	1	87.610			
Sum Weight:	8.85	28.61						OTM	3480.56 kip-ft	39.58		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K							ft^2	K	plf	
T1 188.00-	0.07	0.43	A	0.401	2.062	0.652	0.825	1	15.279	0.94	117.88	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
180.00			B	0.192	2.622	0.589	0.825	1	7.572			
			C	0.179	2.669	0.586	0.825	1	7.126			
T2 180.00-160.00	0.35	0.81	A	0.432	2.005	0.665	0.825	1	46.401	2.72	136.10	A
			B	0.239	2.471	0.599	0.825	1	24.642			
			C	0.127	2.857	0.578	0.825	1	14.003			
T3 160.00-140.00	0.71	1.47	A	0.387	2.091	0.646	0.825	1	51.876	3.07	153.66	B
			B	0.389	2.087	0.647	0.825	1	52.172			
			C	0.287	2.331	0.612	0.825	1	37.692			
T4 140.00-120.00	1.04	2.09	A	0.353	2.165	0.634	0.825	1	57.644	4.64	232.22	B
			B	0.522	1.873	0.709	0.825	1	91.512			
			C	0.357	2.156	0.635	0.825	1	58.333			
T5 120.00-100.00	1.13	2.60	A	0.32	2.243	0.622	0.825	1	61.326	4.69	234.50	B
			B	0.463	1.952	0.68	0.825	1	92.993			
			C	0.38	2.104	0.644	0.825	1	73.816			
T6 100.00-80.00	1.13	2.67	A	0.285	2.335	0.612	0.825	1	61.873	4.58	229.05	B
			B	0.41	2.045	0.656	0.825	1	91.804			
			C	0.337	2.201	0.628	0.825	1	73.815			
T7 80.00-60.00	1.13	3.73	A	0.269	2.383	0.607	0.825	1	65.926	4.54	226.80	B
			B	0.379	2.107	0.643	0.825	1	94.812			
			C	0.315	2.257	0.621	0.825	1	77.539			
T8 60.00-40.00	1.13	4.18	A	0.261	2.405	0.605	0.825	1	71.733	4.44	222.05	B
			B	0.359	2.15	0.636	0.825	1	100.132			
			C	0.302	2.29	0.617	0.825	1	83.215			
T9 40.00-20.00	1.13	4.99	A	0.242	2.46	0.6	0.825	1	73.377	4.10	204.84	B
			B	0.332	2.215	0.626	0.825	1	100.990			
			C	0.28	2.351	0.61	0.825	1	84.599			
T10 20.00-0.00	1.02	5.65	A	0.218	2.537	0.594	0.825	1	71.907	4.07	203.43	B
			B	0.292	2.317	0.614	0.825	1	95.857			
			C	0.249	2.44	0.602	0.825	1	81.716			
Sum Weight:	8.85	28.61						OTM	3332.37 kip-ft	37.80		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 188.00-180.00	0.07	0.43	A	0.401	2.062	0.652	0.8	1	15.131	0.93	116.74	A
			B	0.192	2.622	0.589	0.8	1	7.424			
			C	0.179	2.669	0.586	0.8	1	6.978			
T2 180.00-160.00	0.35	0.81	A	0.432	2.005	0.665	0.8	1	46.145	2.71	135.35	A
			B	0.239	2.471	0.599	0.8	1	24.386			
			C	0.127	2.857	0.578	0.8	1	13.747			
T3 160.00-140.00	0.71	1.47	A	0.387	2.091	0.646	0.8	1	51.522	3.05	152.62	B
			B	0.389	2.087	0.647	0.8	1	51.818			
			C	0.287	2.331	0.612	0.8	1	37.338			
T4 140.00-120.00	1.04	2.09	A	0.353	2.165	0.634	0.8	1	57.155	4.62	230.98	B
			B	0.522	1.873	0.709	0.8	1	91.024			
			C	0.357	2.156	0.635	0.8	1	57.845			
T5 120.00-100.00	1.13	2.60	A	0.32	2.243	0.622	0.8	1	60.771	4.66	233.10	B
			B	0.463	1.952	0.68	0.8	1	92.437			
			C	0.38	2.104	0.644	0.8	1	73.261			
T6 100.00-80.00	1.13	2.67	A	0.285	2.335	0.612	0.8	1	61.344	4.55	227.73	B
			B	0.41	2.045	0.656	0.8	1	91.275			
			C	0.337	2.201	0.628	0.8	1	73.285			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T7 80.00-60.00	1.13	3.73	A	0.269	2.383	0.607	0.8	1	65.264	4.50	225.21	B
			B	0.379	2.107	0.643	0.8	1	94.150			
			C	0.315	2.257	0.621	0.8	1	76.877			
T8 60.00-40.00	1.13	4.18	A	0.261	2.405	0.605	0.8	1	71.012	4.41	220.45	B
			B	0.359	2.15	0.636	0.8	1	99.411			
			C	0.302	2.29	0.617	0.8	1	82.495			
T9 40.00-20.00	1.13	4.99	A	0.242	2.46	0.6	0.8	1	72.595	4.07	203.25	B
			B	0.332	2.215	0.626	0.8	1	100.208			
			C	0.28	2.351	0.61	0.8	1	83.817			
T10 20.00-0.00	1.02	5.65	A	0.218	2.537	0.594	0.8	1	71.065	4.03	201.64	B
			B	0.292	2.317	0.614	0.8	1	95.015			
			C	0.249	2.44	0.602	0.8	1	80.873			
Sum Weight:	8.85	28.61						OTM	3311.20 kip-ft	37.54		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 188.00-180.00	0.07	0.43	A	0.401	2.062	0.652	0.85	1	15.427	0.95	119.02	A
			B	0.192	2.622	0.589	0.85	1	7.719			
			C	0.179	2.669	0.586	0.85	1	7.274			
T2 180.00-160.00	0.35	0.81	A	0.432	2.005	0.665	0.85	1	46.658	2.74	136.85	A
			B	0.239	2.471	0.599	0.85	1	24.898			
			C	0.127	2.857	0.578	0.85	1	14.259			
T3 160.00-140.00	0.71	1.47	A	0.387	2.091	0.646	0.85	1	52.230	3.09	154.70	B
			B	0.389	2.087	0.647	0.85	1	52.526			
			C	0.287	2.331	0.612	0.85	1	38.047			
T4 140.00-120.00	1.04	2.09	A	0.353	2.165	0.634	0.85	1	58.133	4.67	233.46	B
			B	0.522	1.873	0.709	0.85	1	92.001			
			C	0.357	2.156	0.635	0.85	1	58.822			
T5 120.00-100.00	1.13	2.60	A	0.32	2.243	0.622	0.85	1	61.882	4.72	235.90	B
			B	0.463	1.952	0.68	0.85	1	93.548			
			C	0.38	2.104	0.644	0.85	1	74.372			
T6 100.00-80.00	1.13	2.67	A	0.285	2.335	0.612	0.85	1	62.402	4.61	230.37	B
			B	0.41	2.045	0.656	0.85	1	92.334			
			C	0.337	2.201	0.628	0.85	1	74.344			
T7 80.00-60.00	1.13	3.73	A	0.269	2.383	0.607	0.85	1	66.589	4.57	228.38	B
			B	0.379	2.107	0.643	0.85	1	95.475			
			C	0.315	2.257	0.621	0.85	1	78.202			
T8 60.00-40.00	1.13	4.18	A	0.261	2.405	0.605	0.85	1	72.453	4.47	223.65	B
			B	0.359	2.15	0.636	0.85	1	100.852			
			C	0.302	2.29	0.617	0.85	1	83.936			
T9 40.00-20.00	1.13	4.99	A	0.242	2.46	0.6	0.85	1	74.158	4.13	206.43	B
			B	0.332	2.215	0.626	0.85	1	101.772			
			C	0.28	2.351	0.61	0.85	1	85.381			
T10 20.00-0.00	1.02	5.65	A	0.218	2.537	0.594	0.85	1	72.749	4.10	205.22	B
			B	0.292	2.317	0.614	0.85	1	96.699			
			C	0.249	2.44	0.602	0.85	1	82.558			
Sum Weight:	8.85	28.61						OTM	3353.54 kip-ft	38.05		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 188.00-180.00	0.19	0.70	A	0.583	1.815	0.743	1	1	25.457	1.04	129.67	A
			B	0.28	2.349	0.61	1	1	11.755			
			C	0.255	2.423	0.603	1	1	10.840			
T2 180.00-160.00	0.95	1.31	A	0.634	1.787	0.775	1	1	79.829	3.13	156.50	A
			B	0.36	2.148	0.636	1	1	39.859			
			C	0.184	2.65	0.587	1	1	21.282			
T3 160.00-140.00	1.95	2.10	A	0.555	1.839	0.727	1	1	84.073	3.39	169.55	B
			B	0.573	1.823	0.738	1	1	87.847			
			C	0.428	2.011	0.663	1	1	61.262			
T4 140.00-120.00	2.85	2.93	A	0.494	1.908	0.695	1	1	89.273	5.88	294.09	B
			B	0.758	1.791	0.863	1	1	161.571			
			C	0.527	1.867	0.712	1	1	96.633			
T5 120.00-100.00	3.08	3.57	A	0.443	1.985	0.67	1	1	92.478	5.40	270.15	B
			B	0.667	1.778	0.797	1	1	156.842			
			C	0.555	1.839	0.727	1	1	121.799			
T6 100.00-80.00	3.08	3.63	A	0.388	2.088	0.647	1	1	90.381	4.93	246.39	B
			B	0.582	1.816	0.743	1	1	148.298			
			C	0.485	1.92	0.69	1	1	117.168			
T7 80.00-60.00	3.08	4.85	A	0.362	2.145	0.637	1	1	94.999	4.73	236.49	B
			B	0.535	1.859	0.716	1	1	149.397			
			C	0.448	1.976	0.672	1	1	120.433			
T8 60.00-40.00	3.08	5.45	A	0.345	2.183	0.631	1	1	101.265	4.52	225.81	B
			B	0.499	1.901	0.697	1	1	153.584			
			C	0.422	2.021	0.661	1	1	125.950			
T9 40.00-20.00	3.08	6.34	A	0.321	2.243	0.622	1	1	103.132	4.11	205.69	B
			B	0.461	1.957	0.678	1	1	153.058			
			C	0.391	2.083	0.648	1	1	126.864			
T10 20.00-0.00	2.77	7.08	A	0.286	2.333	0.612	1	1	100.062	4.02	201.07	B
			B	0.402	2.059	0.653	1	1	142.142			
			C	0.344	2.185	0.63	1	1	120.305			
Sum Weight:	24.12	37.96						OTM	3754.59 kip-ft	41.15		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 188.00-180.00	0.19	0.70	A	0.583	1.815	0.743	0.825	1	24.422	1.00	124.39	A
			B	0.28	2.349	0.61	0.825	1	10.721			
			C	0.255	2.423	0.603	0.825	1	9.805			
T2 180.00-160.00	0.95	1.31	A	0.634	1.787	0.775	0.825	1	78.036	3.06	152.98	A
			B	0.36	2.148	0.636	0.825	1	38.066			
			C	0.184	2.65	0.587	0.825	1	19.489			
T3 160.00-140.00	1.95	2.10	A	0.555	1.839	0.727	0.825	1	81.595	3.30	164.76	B
			B	0.573	1.823	0.738	0.825	1	85.369			
			C	0.428	2.011	0.663	0.825	1	58.784			
T4 140.00-120.00	2.85	2.93	A	0.494	1.908	0.695	0.825	1	85.852	5.76	287.86	B
			B	0.758	1.791	0.863	0.825	1	158.150			
			C	0.527	1.867	0.712	0.825	1	93.212			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T5 120.00-100.00	3.08	3.57	A	0.443	1.985	0.67	0.825	1	88.589	5.27	263.45	B
			B	0.667	1.778	0.797	0.825	1	152.953			
			C	0.555	1.839	0.727	0.825	1	117.909			
T6 100.00-80.00	3.08	3.63	A	0.388	2.088	0.647	0.825	1	86.677	4.80	240.24	B
			B	0.582	1.816	0.743	0.825	1	144.594			
			C	0.485	1.92	0.69	0.825	1	113.464			
T7 80.00-60.00	3.08	4.85	A	0.362	2.145	0.637	0.825	1	90.361	4.58	229.15	B
			B	0.535	1.859	0.716	0.825	1	144.759			
			C	0.448	1.976	0.672	0.825	1	115.796			
T8 60.00-40.00	3.08	5.45	A	0.345	2.183	0.631	0.825	1	96.222	4.37	218.40	B
			B	0.499	1.901	0.697	0.825	1	148.541			
			C	0.422	2.021	0.661	0.825	1	120.907			
T9 40.00-20.00	3.08	6.34	A	0.321	2.243	0.622	0.825	1	97.659	3.97	198.33	B
			B	0.461	1.957	0.678	0.825	1	147.585			
			C	0.391	2.083	0.648	0.825	1	121.391			
T10 20.00-0.00	2.77	7.08	A	0.286	2.333	0.612	0.825	1	94.168	3.85	192.73	B
			B	0.402	2.059	0.653	0.825	1	136.248			
			C	0.344	2.185	0.63	0.825	1	114.410			
Sum Weight:	24.12	37.96						OTM	3654.75 kip-ft	39.95		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 188.00-180.00	0.19	0.70	A	0.583	1.815	0.743	0.8	1	24.274	0.99	123.64	A
			B	0.28	2.349	0.61	0.8	1	10.573			
			C	0.255	2.423	0.603	0.8	1	9.658			
T2 180.00-160.00	0.95	1.31	A	0.634	1.787	0.775	0.8	1	77.780	3.05	152.48	A
			B	0.36	2.148	0.636	0.8	1	37.810			
			C	0.184	2.65	0.587	0.8	1	19.233			
T3 160.00-140.00	1.95	2.10	A	0.555	1.839	0.727	0.8	1	81.241	3.28	164.08	B
			B	0.573	1.823	0.738	0.8	1	85.015			
			C	0.428	2.011	0.663	0.8	1	58.430			
T4 140.00-120.00	2.85	2.93	A	0.494	1.908	0.695	0.8	1	85.363	5.74	286.97	B
			B	0.758	1.791	0.863	0.8	1	157.661			
			C	0.527	1.867	0.712	0.8	1	92.724			
T5 120.00-100.00	3.08	3.57	A	0.443	1.985	0.67	0.8	1	88.033	5.25	262.49	B
			B	0.667	1.778	0.797	0.8	1	152.397			
			C	0.555	1.839	0.727	0.8	1	117.354			
T6 100.00-80.00	3.08	3.63	A	0.388	2.088	0.647	0.8	1	86.148	4.79	239.36	B
			B	0.582	1.816	0.743	0.8	1	144.065			
			C	0.485	1.92	0.69	0.8	1	112.935			
T7 80.00-60.00	3.08	4.85	A	0.362	2.145	0.637	0.8	1	89.699	4.56	228.10	B
			B	0.535	1.859	0.716	0.8	1	144.097			
			C	0.448	1.976	0.672	0.8	1	115.133			
T8 60.00-40.00	3.08	5.45	A	0.345	2.183	0.631	0.8	1	95.501	4.35	217.34	B
			B	0.499	1.901	0.697	0.8	1	147.821			
			C	0.422	2.021	0.661	0.8	1	120.187			
T9 40.00-20.00	3.08	6.34	A	0.321	2.243	0.622	0.8	1	96.877	3.95	197.28	B
			B	0.461	1.957	0.678	0.8	1	146.803			
			C	0.391	2.083	0.648	0.8	1	120.609			
T10 20.00-0.00	2.77	7.08	A	0.286	2.333	0.612	0.8	1	93.326	3.83	191.54	B
			B	0.402	2.059	0.653	0.8	1	135.406			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	24.12	37.96	C	0.344	2.185	0.63	0.8	1 OTM	113.568 3640.49 kip-ft	39.78		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 188.00-180.00	0.19	0.70	A	0.583	1.815	0.743	0.85	1	24.570	1.00	125.15	A
			B	0.28	2.349	0.61	0.85	1	10.868			
			C	0.255	2.423	0.603	0.85	1	9.953			
T2 180.00-160.00	0.95	1.31	A	0.634	1.787	0.775	0.85	1	78.292	3.07	153.48	A
			B	0.36	2.148	0.636	0.85	1	38.322			
			C	0.184	2.65	0.587	0.85	1	19.746			
T3 160.00-140.00	1.95	2.10	A	0.555	1.839	0.727	0.85	1	81.949	3.31	165.45	B
			B	0.573	1.823	0.738	0.85	1	85.723			
			C	0.428	2.011	0.663	0.85	1	59.138			
T4 140.00-120.00	2.85	2.93	A	0.494	1.908	0.695	0.85	1	86.340	5.78	288.75	B
			B	0.758	1.791	0.863	0.85	1	158.638			
			C	0.527	1.867	0.712	0.85	1	93.701			
T5 120.00-100.00	3.08	3.57	A	0.443	1.985	0.67	0.85	1	89.144	5.29	264.40	B
			B	0.667	1.778	0.797	0.85	1	153.508			
			C	0.555	1.839	0.727	0.85	1	118.465			
T6 100.00-80.00	3.08	3.63	A	0.388	2.088	0.647	0.85	1	87.206	4.82	241.12	B
			B	0.582	1.816	0.743	0.85	1	145.123			
			C	0.485	1.92	0.69	0.85	1	113.994			
T7 80.00-60.00	3.08	4.85	A	0.362	2.145	0.637	0.85	1	91.024	4.60	230.20	B
			B	0.535	1.859	0.716	0.85	1	145.422			
			C	0.448	1.976	0.672	0.85	1	116.458			
T8 60.00-40.00	3.08	5.45	A	0.345	2.183	0.631	0.85	1	96.942	4.39	219.46	B
			B	0.499	1.901	0.697	0.85	1	149.262			
			C	0.422	2.021	0.661	0.85	1	121.627			
T9 40.00-20.00	3.08	6.34	A	0.321	2.243	0.622	0.85	1	98.441	3.99	199.38	B
			B	0.461	1.957	0.678	0.85	1	148.367			
			C	0.391	2.083	0.648	0.85	1	122.173			
T10 20.00-0.00	2.77	7.08	A	0.286	2.333	0.612	0.85	1	95.010	3.88	193.92	B
			B	0.402	2.059	0.653	0.85	1	137.090			
			C	0.344	2.185	0.63	0.85	1	115.252			
Sum Weight:	24.12	37.96						OTM	3669.01 kip-ft	40.12		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 188.00-180.00	0.07	0.43	A	0.401	2.062	0.652	1	1	16.314	0.57	70.80	A
			B	0.192	2.622	0.589	1	1	8.606			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.179	2.669	0.586	1	1	8.161			
T2 180.00-160.00	0.35	0.81	A	0.432	2.005	0.665	1	1	48.194	1.59	79.52	A
			B	0.239	2.471	0.599	1	1	26.435			
			C	0.127	2.857	0.578	1	1	15.796			
T3 160.00-140.00	0.71	1.47	A	0.387	2.091	0.646	1	1	54.354	1.81	90.54	B
			B	0.389	2.087	0.647	1	1	54.650			
			C	0.287	2.331	0.612	1	1	40.171			
T4 140.00-120.00	1.04	2.09	A	0.353	2.165	0.634	1	1	61.065	2.71	135.51	B
			B	0.522	1.873	0.709	1	1	94.934			
			C	0.357	2.156	0.635	1	1	61.755			
T5 120.00-100.00	1.13	2.60	A	0.32	2.243	0.622	1	1	65.216	2.75	137.42	B
			B	0.463	1.952	0.68	1	1	96.882			
			C	0.38	2.104	0.644	1	1	77.706			
T6 100.00-80.00	1.13	2.67	A	0.285	2.335	0.612	1	1	65.577	2.68	134.04	B
			B	0.41	2.045	0.656	1	1	95.508			
			C	0.337	2.201	0.628	1	1	77.518			
T7 80.00-60.00	1.13	3.73	A	0.269	2.383	0.607	1	1	70.564	2.68	133.81	B
			B	0.379	2.107	0.643	1	1	99.450			
			C	0.315	2.257	0.621	1	1	82.177			
T8 60.00-40.00	1.13	4.18	A	0.261	2.405	0.605	1	1	76.776	2.62	131.19	B
			B	0.359	2.15	0.636	1	1	105.175			
			C	0.302	2.29	0.617	1	1	88.258			
T9 40.00-20.00	1.13	4.99	A	0.242	2.46	0.6	1	1	78.850	2.43	121.47	B
			B	0.332	2.215	0.626	1	1	106.463			
			C	0.28	2.351	0.61	1	1	90.072			
T10 20.00-0.00	1.02	5.65	A	0.218	2.537	0.594	1	1	77.801	2.43	121.47	B
			B	0.292	2.317	0.614	1	1	101.751			
			C	0.249	2.44	0.602	1	1	87.610			
Sum Weight:	8.85	28.61						OTM	1957.82 kip-ft	22.27		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 188.00-180.00	0.07	0.43	A	0.401	2.062	0.652	0.825	1	15.279	0.53	66.31	A
			B	0.192	2.622	0.589	0.825	1	7.572			
			C	0.179	2.669	0.586	0.825	1	7.126			
T2 180.00-160.00	0.35	0.81	A	0.432	2.005	0.665	0.825	1	46.401	1.53	76.56	A
			B	0.239	2.471	0.599	0.825	1	24.642			
			C	0.127	2.857	0.578	0.825	1	14.003			
T3 160.00-140.00	0.71	1.47	A	0.387	2.091	0.646	0.825	1	51.876	1.73	86.43	B
			B	0.389	2.087	0.647	0.825	1	52.172			
			C	0.287	2.331	0.612	0.825	1	37.692			
T4 140.00-120.00	1.04	2.09	A	0.353	2.165	0.634	0.825	1	57.644	2.61	130.63	B
			B	0.522	1.873	0.709	0.825	1	91.512			
			C	0.357	2.156	0.635	0.825	1	58.333			
T5 120.00-100.00	1.13	2.60	A	0.32	2.243	0.622	0.825	1	61.326	2.64	131.90	B
			B	0.463	1.952	0.68	0.825	1	92.993			
			C	0.38	2.104	0.644	0.825	1	73.816			
T6 100.00-80.00	1.13	2.67	A	0.285	2.335	0.612	0.825	1	61.873	2.58	128.84	B
			B	0.41	2.045	0.656	0.825	1	91.804			
			C	0.337	2.201	0.628	0.825	1	73.815			
T7 80.00-	1.13	3.73	A	0.269	2.383	0.607	0.825	1	65.926	2.55	127.57	B

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
60.00			B	0.379	2.107	0.643	0.825	1	94.812			
			C	0.315	2.257	0.621	0.825	1	77.539			
T8 60.00-40.00	1.13	4.18	A	0.261	2.405	0.605	0.825	1	71.733	2.50	124.90	B
			B	0.359	2.15	0.636	0.825	1	100.132			
			C	0.302	2.29	0.617	0.825	1	83.215			
T9 40.00-20.00	1.13	4.99	A	0.242	2.46	0.6	0.825	1	73.377	2.30	115.22	B
			B	0.332	2.215	0.626	0.825	1	100.990			
			C	0.28	2.351	0.61	0.825	1	84.599			
T10 20.00-0.00	1.02	5.65	A	0.218	2.537	0.594	0.825	1	71.907	2.29	114.43	B
			B	0.292	2.317	0.614	0.825	1	95.857			
			C	0.249	2.44	0.602	0.825	1	81.716			
Sum Weight:	8.85	28.61						OTM	1874.46 kip-ft	21.26		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 188.00-180.00	0.07	0.43	A	0.401	2.062	0.652	0.8	1	15.131	0.53	65.67	A
			B	0.192	2.622	0.589	0.8	1	7.424			
			C	0.179	2.669	0.586	0.8	1	6.978			
T2 180.00-160.00	0.35	0.81	A	0.432	2.005	0.665	0.8	1	46.145	1.52	76.13	A
			B	0.239	2.471	0.599	0.8	1	24.386			
			C	0.127	2.857	0.578	0.8	1	13.747			
T3 160.00-140.00	0.71	1.47	A	0.387	2.091	0.646	0.8	1	51.522	1.72	85.85	B
			B	0.389	2.087	0.647	0.8	1	51.818			
			C	0.287	2.331	0.612	0.8	1	37.338			
T4 140.00-120.00	1.04	2.09	A	0.353	2.165	0.634	0.8	1	57.155	2.60	129.93	B
			B	0.522	1.873	0.709	0.8	1	91.024			
			C	0.357	2.156	0.635	0.8	1	57.845			
T5 120.00-100.00	1.13	2.60	A	0.32	2.243	0.622	0.8	1	60.771	2.62	131.12	B
			B	0.463	1.952	0.68	0.8	1	92.437			
			C	0.38	2.104	0.644	0.8	1	73.261			
T6 100.00-80.00	1.13	2.67	A	0.285	2.335	0.612	0.8	1	61.344	2.56	128.10	B
			B	0.41	2.045	0.656	0.8	1	91.275			
			C	0.337	2.201	0.628	0.8	1	73.285			
T7 80.00-60.00	1.13	3.73	A	0.269	2.383	0.607	0.8	1	65.264	2.53	126.68	B
			B	0.379	2.107	0.643	0.8	1	94.150			
			C	0.315	2.257	0.621	0.8	1	76.877			
T8 60.00-40.00	1.13	4.18	A	0.261	2.405	0.605	0.8	1	71.012	2.48	124.00	B
			B	0.359	2.15	0.636	0.8	1	99.411			
			C	0.302	2.29	0.617	0.8	1	82.495			
T9 40.00-20.00	1.13	4.99	A	0.242	2.46	0.6	0.8	1	72.595	2.29	114.33	B
			B	0.332	2.215	0.626	0.8	1	100.208			
			C	0.28	2.351	0.61	0.8	1	83.817			
T10 20.00-0.00	1.02	5.65	A	0.218	2.537	0.594	0.8	1	71.065	2.27	113.43	B
			B	0.292	2.317	0.614	0.8	1	95.015			
			C	0.249	2.44	0.602	0.8	1	80.873			
Sum Weight:	8.85	28.61						OTM	1862.55 kip-ft	21.12		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 188.00-180.00	0.07	0.43	A	0.401	2.062	0.652	0.85	1	15.427	0.54	66.95	A
			B	0.192	2.622	0.589	0.85	1	7.719			
			C	0.179	2.669	0.586	0.85	1	7.274			
T2 180.00-160.00	0.35	0.81	A	0.432	2.005	0.665	0.85	1	46.658	1.54	76.98	A
			B	0.239	2.471	0.599	0.85	1	24.898			
			C	0.127	2.857	0.578	0.85	1	14.259			
T3 160.00-140.00	0.71	1.47	A	0.387	2.091	0.646	0.85	1	52.230	1.74	87.02	B
			B	0.389	2.087	0.647	0.85	1	52.526			
			C	0.287	2.331	0.612	0.85	1	38.047			
T4 140.00-120.00	1.04	2.09	A	0.353	2.165	0.634	0.85	1	58.133	2.63	131.32	B
			B	0.522	1.873	0.709	0.85	1	92.001			
			C	0.357	2.156	0.635	0.85	1	58.822			
T5 120.00-100.00	1.13	2.60	A	0.32	2.243	0.622	0.85	1	61.882	2.65	132.69	B
			B	0.463	1.952	0.68	0.85	1	93.548			
			C	0.38	2.104	0.644	0.85	1	74.372			
T6 100.00-80.00	1.13	2.67	A	0.285	2.335	0.612	0.85	1	62.402	2.59	129.59	B
			B	0.41	2.045	0.656	0.85	1	92.334			
			C	0.337	2.201	0.628	0.85	1	74.344			
T7 80.00-60.00	1.13	3.73	A	0.269	2.383	0.607	0.85	1	66.589	2.57	128.46	B
			B	0.379	2.107	0.643	0.85	1	95.475			
			C	0.315	2.257	0.621	0.85	1	78.202			
T8 60.00-40.00	1.13	4.18	A	0.261	2.405	0.605	0.85	1	72.453	2.52	125.80	B
			B	0.359	2.15	0.636	0.85	1	100.852			
			C	0.302	2.29	0.617	0.85	1	83.936			
T9 40.00-20.00	1.13	4.99	A	0.242	2.46	0.6	0.85	1	74.158	2.32	116.11	B
			B	0.332	2.215	0.626	0.85	1	101.772			
			C	0.28	2.351	0.61	0.85	1	85.381			
T10 20.00-0.00	1.02	5.65	A	0.218	2.537	0.594	0.85	1	72.749	2.31	115.44	B
			B	0.292	2.317	0.614	0.85	1	96.699			
			C	0.249	2.44	0.602	0.85	1	82.558			
Sum Weight:	8.85	28.61						OTM	1886.37 kip-ft	21.40		

Discrete Appurtenance Pressures - No Ice $G_H = 1.118$

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft²	C_AA_C Side ft²
BCD-87010__	240.0000	0.03	-3.51	2.02	193.50	1.658	27	1.92	1.92
RR90-17-02DP w/Mount Pipe	30.0000	0.12	0.00	-7.51	188.00	1.644	27	14.73	10.91
RR90-17-02DP w/Mount Pipe	150.0000	0.12	6.50	3.75	188.00	1.644	27	14.73	10.91
RR90-17-02DP w/Mount Pipe	270.0000	0.12	-6.50	3.75	188.00	1.644	27	14.73	10.91
Pirod 15' Low Profile Platform	0.0000	1.81	0.00	0.00	188.00	1.644	27	24.90	24.90
APXV18-206517S-C w/ mounting hardware	0.0000	0.05	0.00	-4.97	177.00	1.616	26	5.08	4.46
APXV18-206517S-C w/ mounting hardware	120.0000	0.05	4.30	2.48	177.00	1.616	26	5.08	4.46
APXV18-206517S-C w/ mounting hardware	240.0000	0.05	-4.30	2.48	177.00	1.616	26	5.08	4.46

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
7770 Panel Antenna	240.0000	0.04	-10.37	5.99	168.00	1.592	26	5.88	2.93
7770 Panel Antenna	360.0000	0.04	0.00	-11.98	168.00	1.592	26	5.88	2.93
7770 Panel Antenna	120.0000	0.04	10.37	5.99	168.00	1.592	26	5.88	2.93
LGP 13519 Diplexer	240.0000	0.01	-10.37	5.99	168.00	1.592	26	0.27	0.13
LGP 13519 Diplexer	360.0000	0.01	0.00	-11.98	168.00	1.592	26	0.27	0.13
LGP 13519 Diplexer	120.0000	0.01	10.37	5.99	168.00	1.592	26	0.27	0.13
7060 CILOC	240.0000	0.00	-10.37	5.99	168.00	1.592	26	0.07	0.06
7020 RCU/RETs	240.0000	0.00	-10.37	5.99	168.00	1.592	26	0.40	0.12
7020 RCU/RETs	360.0000	0.00	0.00	-11.98	168.00	1.592	26	0.40	0.12
7020 RCU/RETs	120.0000	0.00	10.37	5.99	168.00	1.592	26	0.40	0.12
LGP214nn TMA	240.0000	0.00	-10.37	5.99	168.00	1.592	26	2.58	0.47
LGP214nn TMA	360.0000	0.00	0.00	-11.98	168.00	1.592	26	2.58	0.47
LGP214nn TMA	120.0000	0.00	10.37	5.99	168.00	1.592	26	2.58	0.47
DUO1417-8686 w/Mount Pipe	240.0000	0.10	-10.37	5.99	168.00	1.592	26	14.49	11.73
DUO1417-8686 w/Mount Pipe	360.0000	0.10	0.00	-11.98	168.00	1.592	26	14.49	11.73
DUO1417-8686 w/Mount Pipe	120.0000	0.10	10.37	5.99	168.00	1.592	26	14.49	11.73
Rohn 15 Foot Sector Frame	240.0000	0.39	-10.37	5.99	168.00	1.592	26	13.90	3.08
Rohn 15 Foot Sector Frame	360.0000	0.39	0.00	-11.98	168.00	1.592	26	13.90	3.08
Rohn 15 Foot Sector Frame	120.0000	0.39	10.37	5.99	168.00	1.592	26	13.90	3.08
APX16DWV-16DWV-S-E-ACU w/ Mount	240.0000	0.07	-9.83	5.68	153.00	1.550	25	6.70	3.27
APX16DWV-16DWV-S-E-ACU w/ Mount	360.0000	0.07	-0.00	-11.35	153.00	1.550	25	6.70	3.27
APX16DWV-16DWV-S-E-ACU w/ Mount	120.0000	0.07	9.83	5.67	153.00	1.550	25	6.70	3.27
Twin TMA	240.0000	0.01	-9.83	5.68	153.00	1.550	25	0.67	0.37
Twin TMA	360.0000	0.01	-0.00	-11.35	153.00	1.550	25	0.67	0.37
Twin TMA	120.0000	0.01	9.83	5.67	153.00	1.550	25	0.67	0.37
RR90-17-02DP w/Mount Pipe	210.0000	0.04	-8.11	4.71	153.00	1.550	25	4.91	3.64
RR90-17-02DP w/Mount Pipe	210.0000	0.04	-11.55	6.65	153.00	1.550	25	4.91	3.64
RR90-17-02DP w/Mount Pipe	330.0000	0.04	-0.02	-9.38	153.00	1.550	25	4.91	3.64
RR90-17-02DP w/Mount Pipe	330.0000	0.04	0.01	-13.32	153.00	1.550	25	4.91	3.64
RR90-17-02DP w/Mount Pipe	90.0000	0.04	8.13	4.67	153.00	1.550	25	4.91	3.64
RR90-17-02DP w/Mount Pipe	90.0000	0.04	11.53	6.67	153.00	1.550	25	4.91	3.64
TMA	210.0000	0.04	-9.83	5.68	153.00	1.550	25	4.36	0.74
TMA	330.0000	0.04	-0.00	-11.35	153.00	1.550	25	4.36	0.74
TMA	90.0000	0.04	9.83	5.67	153.00	1.550	25	4.36	0.74
Rohn 12 Foot Sector Frame	240.0000	0.36	-9.83	5.67	153.00	1.550	25	12.20	3.08
Rohn 12 Foot Sector Frame	360.0000	0.36	0.00	-11.35	153.00	1.550	25	12.20	3.08
Rohn 12 Foot Sector Frame	120.0000	0.36	9.83	5.67	153.00	1.550	25	12.20	3.08
WPA-80090/4CF	240.0000	0.01	-6.40	3.69	144.00	1.523	25	3.73	2.71
WPA-80090/4CF	360.0000	0.01	-0.00	-7.39	144.00	1.523	25	3.73	2.71
WPA-80090/4CF	120.0000	0.01	6.40	3.69	144.00	1.523	25	3.73	2.71
WPA-80090/4CF	240.0000	0.01	-16.79	9.69	144.00	1.523	25	3.73	2.71
WPA-80090/4CF	360.0000	0.01	0.00	-19.39	144.00	1.523	25	3.73	2.71
WPA-80090/4CF	120.0000	0.01	16.79	9.69	144.00	1.523	25	3.73	2.71

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Rymsa MG D3-800Tx	240.0000	0.03	-8.13	4.69	144.00	1.523	25	3.57	3.43
Rymsa MG D3-800Tx	360.0000	0.03	0.00	-9.39	144.00	1.523	25	3.57	3.43
Rymsa MG D3-800Tx	120.0000	0.03	8.13	4.69	144.00	1.523	25	3.57	3.43
P65-15-XL-2	240.0000	0.07	-15.05	8.69	144.00	1.523	25	8.54	5.99
P65-15-XL-2	360.0000	0.07	0.00	-17.38	144.00	1.523	25	8.54	5.99
P65-15-XL-2	120.0000	0.07	15.05	8.69	144.00	1.523	25	8.54	5.99
Rohn 15 Foot Sector Frame	240.0000	0.39	-11.59	6.69	144.00	1.523	25	13.90	3.08
Rohn 15 Foot Sector Frame	360.0000	0.39	0.00	-13.39	144.00	1.523	25	13.90	3.08
Rohn 15 Foot Sector Frame	120.0000	0.39	11.59	6.69	144.00	1.523	25	13.90	3.08
DB980H90E-M w/Mount Pipe	240.0000	0.06	-10.49	6.05	124.00	1.460	24	8.55	7.71
DB980H90E-M w/Mount Pipe	360.0000	0.06	0.00	-12.11	124.00	1.460	24	8.55	7.71
DB980H90E-M w/Mount Pipe	120.0000	0.06	10.49	6.05	124.00	1.460	24	8.55	7.71
Rohn 12 Foot Sector Frame	240.0000	0.36	-10.49	6.05	124.00	1.460	24	12.20	3.08
Rohn 12 Foot Sector Frame	360.0000	0.36	0.00	-12.11	124.00	1.460	24	12.20	3.08
Rohn 12 Foot Sector Frame	120.0000	0.36	10.49	6.05	124.00	1.460	24	12.20	3.08
FD9R6004/2C-3L Diplexer	210.0000	0.00	-10.56	4.41	144.00	1.523	25	0.37	0.08
FD9R6004/2C-3L Diplexer	330.0000	0.00	1.46	-11.35	144.00	1.523	25	0.37	0.08
FD9R6004/2C-3L Diplexer	90.0000	0.00	9.10	6.94	144.00	1.523	25	0.37	0.08
	Sum Weight:	8.43							

Discrete Appurtenance Pressures - With Ice $G_H = 1.118$

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
BCD-87010__	240.0000	0.04	-3.51	2.02	193.50	1.658	20	2.68	2.68	0.5000
RR90-17-02DP w/Mount Pipe	30.0000	0.24	0.00	-7.51	188.00	1.644	20	16.71	14.11	0.5000
RR90-17-02DP w/Mount Pipe	150.0000	0.24	6.50	3.75	188.00	1.644	20	16.71	14.11	0.5000
RR90-17-02DP w/Mount Pipe	270.0000	0.24	-6.50	3.75	188.00	1.644	20	16.71	14.11	0.5000
Pirod 15' Low Profile Platform	0.0000	2.35	0.00	0.00	188.00	1.644	20	30.70	30.70	0.5000
APXV18-206517S-C w/ mounting hardware	0.0000	0.09	0.00	-4.97	177.00	1.616	20	5.53	5.39	0.5000
APXV18-206517S-C w/ mounting hardware	120.0000	0.09	4.30	2.48	177.00	1.616	20	5.53	5.39	0.5000
APXV18-206517S-C w/ mounting hardware	240.0000	0.09	-4.30	2.48	177.00	1.616	20	5.53	5.39	0.5000
7770 Panel Antenna	240.0000	0.07	-10.37	5.99	168.00	1.592	20	6.31	3.27	0.5000
7770 Panel Antenna	360.0000	0.07	0.00	-11.98	168.00	1.592	20	6.31	3.27	0.5000
7770 Panel Antenna	120.0000	0.07	10.37	5.99	168.00	1.592	20	6.31	3.27	0.5000
LGP 13519 Diplexer	240.0000	0.01	-10.37	5.99	168.00	1.592	20	0.34	0.18	0.5000
LGP 13519 Diplexer	360.0000	0.01	0.00	-11.98	168.00	1.592	20	0.34	0.18	0.5000

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
LGP 13519 Diplexer	120.0000	0.01	10.37	5.99	168.00	1.592	20	0.34	0.18	0.5000
7060 CILOC	240.0000	0.00	-10.37	5.99	168.00	1.592	20	0.11	0.09	0.5000
7020 RCU/RETs	240.0000	0.01	-10.37	5.99	168.00	1.592	20	0.49	0.17	0.5000
7020 RCU/RETs	360.0000	0.01	0.00	-11.98	168.00	1.592	20	0.49	0.17	0.5000
7020 RCU/RETs	120.0000	0.01	10.37	5.99	168.00	1.592	20	0.49	0.17	0.5000
LGP214nn TMA	240.0000	0.02	-10.37	5.99	168.00	1.592	20	2.89	0.63	0.5000
LGP214nn TMA	360.0000	0.02	0.00	-11.98	168.00	1.592	20	2.89	0.63	0.5000
LGP214nn TMA	120.0000	0.02	10.37	5.99	168.00	1.592	20	2.89	0.63	0.5000
DUO1417-8686 w/Mount Pipe	240.0000	0.21	-10.37	5.99	168.00	1.592	20	15.93	13.93	0.5000
DUO1417-8686 w/Mount Pipe	360.0000	0.21	0.00	-11.98	168.00	1.592	20	15.93	13.93	0.5000
DUO1417-8686 w/Mount Pipe	120.0000	0.21	10.37	5.99	168.00	1.592	20	15.93	13.93	0.5000
Rohn 15 Foot Sector Frame	240.0000	0.53	-10.37	5.99	168.00	1.592	20	20.00	5.13	0.5000
Rohn 15 Foot Sector Frame	360.0000	0.53	0.00	-11.98	168.00	1.592	20	20.00	5.13	0.5000
Rohn 15 Foot Sector Frame	120.0000	0.53	10.37	5.99	168.00	1.592	20	20.00	5.13	0.5000
APX16DWV-16DWV-S-E-ACU w/ Mount	240.0000	0.12	-9.83	5.68	153.00	1.550	19	7.13	3.86	0.5000
APX16DWV-16DWV-S-E-ACU w/ Mount	360.0000	0.12	-0.00	-11.35	153.00	1.550	19	7.13	3.86	0.5000
APX16DWV-16DWV-S-E-ACU w/ Mount	120.0000	0.12	9.83	5.67	153.00	1.550	19	7.13	3.86	0.5000
Twin TMA	240.0000	0.02	-9.83	5.68	153.00	1.550	19	0.78	0.46	0.5000
Twin TMA	360.0000	0.02	-0.00	-11.35	153.00	1.550	19	0.78	0.46	0.5000
Twin TMA	120.0000	0.02	9.83	5.67	153.00	1.550	19	0.78	0.46	0.5000
RR90-17-02DP w/Mount Pipe	210.0000	0.08	-8.11	4.71	153.00	1.550	19	5.57	4.70	0.5000
RR90-17-02DP w/Mount Pipe	210.0000	0.08	-11.55	6.65	153.00	1.550	19	5.57	4.70	0.5000
RR90-17-02DP w/Mount Pipe	330.0000	0.08	-0.02	-9.38	153.00	1.550	19	5.57	4.70	0.5000
RR90-17-02DP w/Mount Pipe	330.0000	0.08	0.01	-13.32	153.00	1.550	19	5.57	4.70	0.5000
RR90-17-02DP w/Mount Pipe	90.0000	0.08	8.13	4.67	153.00	1.550	19	5.57	4.70	0.5000
RR90-17-02DP w/Mount Pipe	90.0000	0.08	11.53	6.67	153.00	1.550	19	5.57	4.70	0.5000
TMA	210.0000	0.06	-9.83	5.68	153.00	1.550	19	4.75	0.99	0.5000
TMA	330.0000	0.06	-0.00	-11.35	153.00	1.550	19	4.75	0.99	0.5000
TMA	90.0000	0.06	9.83	5.67	153.00	1.550	19	4.75	0.99	0.5000
Rohn 12 Foot Sector Frame	240.0000	0.49	-9.83	5.67	153.00	1.550	19	17.60	5.13	0.5000
Rohn 12 Foot Sector Frame	360.0000	0.49	0.00	-11.35	153.00	1.550	19	17.60	5.13	0.5000
Rohn 12 Foot Sector Frame	120.0000	0.49	9.83	5.67	153.00	1.550	19	17.60	5.13	0.5000
WPA-80090/4CF	240.0000	0.04	-6.40	3.69	144.00	1.523	19	4.10	3.01	0.5000
WPA-80090/4CF	360.0000	0.04	-0.00	-7.39	144.00	1.523	19	4.10	3.01	0.5000
WPA-80090/4CF	120.0000	0.04	6.40	3.69	144.00	1.523	19	4.10	3.01	0.5000
WPA-80090/4CF	240.0000	0.04	-16.79	9.69	144.00	1.523	19	4.10	3.01	0.5000
WPA-80090/4CF	360.0000	0.04	0.00	-19.39	144.00	1.523	19	4.10	3.01	0.5000
WPA-80090/4CF	120.0000	0.04	16.79	9.69	144.00	1.523	19	4.10	3.01	0.5000
Rymsa MG D3-800Tx	240.0000	0.06	-8.13	4.69	144.00	1.523	19	3.94	4.07	0.5000
Rymsa MG D3-800Tx	360.0000	0.06	0.00	-9.39	144.00	1.523	19	3.94	4.07	0.5000
Rymsa MG D3-800Tx	120.0000	0.06	8.13	4.69	144.00	1.523	19	3.94	4.07	0.5000
P65-15-XL-2	240.0000	0.13	-15.05	8.69	144.00	1.523	19	9.13	6.89	0.5000
P65-15-XL-2	360.0000	0.13	0.00	-17.38	144.00	1.523	19	9.13	6.89	0.5000

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
P65-15-XL-2	120.0000	0.13	15.05	8.69	144.00	1.523	19	9.13	6.89	0.5000
Rohn 15 Foot Sector Frame	240.0000	0.53	-11.59	6.69	144.00	1.523	19	20.00	5.13	0.5000
Rohn 15 Foot Sector Frame	360.0000	0.53	0.00	-13.39	144.00	1.523	19	20.00	5.13	0.5000
Rohn 15 Foot Sector Frame	120.0000	0.53	11.59	6.69	144.00	1.523	19	20.00	5.13	0.5000
DB980H90E-M w/Mount Pipe	240.0000	0.14	-10.49	6.05	124.00	1.460	18	9.72	9.89	0.5000
DB980H90E-M w/Mount Pipe	360.0000	0.14	0.00	-12.11	124.00	1.460	18	9.72	9.89	0.5000
DB980H90E-M w/Mount Pipe	120.0000	0.14	10.49	6.05	124.00	1.460	18	9.72	9.89	0.5000
Rohn 12 Foot Sector Frame	240.0000	0.49	-10.49	6.05	124.00	1.460	18	17.60	5.13	0.5000
Rohn 12 Foot Sector Frame	360.0000	0.49	0.00	-12.11	124.00	1.460	18	17.60	5.13	0.5000
Rohn 12 Foot Sector Frame	120.0000	0.49	10.49	6.05	124.00	1.460	18	17.60	5.13	0.5000
FD9R6004/2C-3L Diplexer	210.0000	0.00	-10.56	4.41	144.00	1.523	19	0.45	0.14	0.5000
FD9R6004/2C-3L Diplexer	330.0000	0.00	1.46	-11.35	144.00	1.523	19	0.45	0.14	0.5000
FD9R6004/2C-3L Diplexer	90.0000	0.00	9.10	6.94	144.00	1.523	19	0.45	0.14	0.5000
	Sum Weight:	12.75								

Discrete Appurtenance Pressures - Service $G_H = 1.118$

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
BCD-87010__	240.0000	0.03	-3.51	2.02	193.50	1.658	15	1.92	1.92
RR90-17-02DP w/Mount Pipe	30.0000	0.12	0.00	-7.51	188.00	1.644	15	14.73	10.91
RR90-17-02DP w/Mount Pipe	150.0000	0.12	6.50	3.75	188.00	1.644	15	14.73	10.91
RR90-17-02DP w/Mount Pipe	270.0000	0.12	-6.50	3.75	188.00	1.644	15	14.73	10.91
Pirod 15' Low Profile Platform	0.0000	1.81	0.00	0.00	188.00	1.644	15	24.90	24.90
APXV18-206517S-C w/ mounting hardware	0.0000	0.05	0.00	-4.97	177.00	1.616	15	5.08	4.46
APXV18-206517S-C w/ mounting hardware	120.0000	0.05	4.30	2.48	177.00	1.616	15	5.08	4.46
APXV18-206517S-C w/ mounting hardware	240.0000	0.05	-4.30	2.48	177.00	1.616	15	5.08	4.46
7770 Panel Antenna	240.0000	0.04	-10.37	5.99	168.00	1.592	15	5.88	2.93
7770 Panel Antenna	360.0000	0.04	0.00	-11.98	168.00	1.592	15	5.88	2.93
7770 Panel Antenna	120.0000	0.04	10.37	5.99	168.00	1.592	15	5.88	2.93
LGP 13519 Diplexer	240.0000	0.01	-10.37	5.99	168.00	1.592	15	0.27	0.13
LGP 13519 Diplexer	360.0000	0.01	0.00	-11.98	168.00	1.592	15	0.27	0.13
LGP 13519 Diplexer	120.0000	0.01	10.37	5.99	168.00	1.592	15	0.27	0.13
7060 CILOC	240.0000	0.00	-10.37	5.99	168.00	1.592	15	0.07	0.06
7020 RCU/RETs	240.0000	0.00	-10.37	5.99	168.00	1.592	15	0.40	0.12
7020 RCU/RETs	360.0000	0.00	0.00	-11.98	168.00	1.592	15	0.40	0.12
7020 RCU/RETs	120.0000	0.00	10.37	5.99	168.00	1.592	15	0.40	0.12

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
LGP214nn TMA	240.0000	0.00	-10.37	5.99	168.00	1.592	15	2.58	0.47
LGP214nn TMA	360.0000	0.00	0.00	-11.98	168.00	1.592	15	2.58	0.47
LGP214nn TMA	120.0000	0.00	10.37	5.99	168.00	1.592	15	2.58	0.47
DUO1417-8686 w/Mount Pipe	240.0000	0.10	-10.37	5.99	168.00	1.592	15	14.49	11.73
DUO1417-8686 w/Mount Pipe	360.0000	0.10	0.00	-11.98	168.00	1.592	15	14.49	11.73
DUO1417-8686 w/Mount Pipe	120.0000	0.10	10.37	5.99	168.00	1.592	15	14.49	11.73
Rohn 15 Foot Sector Frame	240.0000	0.39	-10.37	5.99	168.00	1.592	15	13.90	3.08
Rohn 15 Foot Sector Frame	360.0000	0.39	0.00	-11.98	168.00	1.592	15	13.90	3.08
Rohn 15 Foot Sector Frame	120.0000	0.39	10.37	5.99	168.00	1.592	15	13.90	3.08
APX16DWV-16DWV-S-E-ACU w/ Mount	240.0000	0.07	-9.83	5.68	153.00	1.550	14	6.70	3.27
APX16DWV-16DWV-S-E-ACU w/ Mount	360.0000	0.07	-0.00	-11.35	153.00	1.550	14	6.70	3.27
APX16DWV-16DWV-S-E-ACU w/ Mount	120.0000	0.07	9.83	5.67	153.00	1.550	14	6.70	3.27
Twin TMA	240.0000	0.01	-9.83	5.68	153.00	1.550	14	0.67	0.37
Twin TMA	360.0000	0.01	-0.00	-11.35	153.00	1.550	14	0.67	0.37
Twin TMA	120.0000	0.01	9.83	5.67	153.00	1.550	14	0.67	0.37
RR90-17-02DP w/Mount Pipe	210.0000	0.04	-8.11	4.71	153.00	1.550	14	4.91	3.64
RR90-17-02DP w/Mount Pipe	210.0000	0.04	-11.55	6.65	153.00	1.550	14	4.91	3.64
RR90-17-02DP w/Mount Pipe	330.0000	0.04	-0.02	-9.38	153.00	1.550	14	4.91	3.64
RR90-17-02DP w/Mount Pipe	330.0000	0.04	0.01	-13.32	153.00	1.550	14	4.91	3.64
RR90-17-02DP w/Mount Pipe	90.0000	0.04	8.13	4.67	153.00	1.550	14	4.91	3.64
RR90-17-02DP w/Mount Pipe	90.0000	0.04	11.53	6.67	153.00	1.550	14	4.91	3.64
TMA	210.0000	0.04	-9.83	5.68	153.00	1.550	14	4.36	0.74
TMA	330.0000	0.04	-0.00	-11.35	153.00	1.550	14	4.36	0.74
TMA	90.0000	0.04	9.83	5.67	153.00	1.550	14	4.36	0.74
Rohn 12 Foot Sector Frame	240.0000	0.36	-9.83	5.67	153.00	1.550	14	12.20	3.08
Rohn 12 Foot Sector Frame	360.0000	0.36	0.00	-11.35	153.00	1.550	14	12.20	3.08
Rohn 12 Foot Sector Frame	120.0000	0.36	9.83	5.67	153.00	1.550	14	12.20	3.08
WPA-80090/4CF	240.0000	0.01	-6.40	3.69	144.00	1.523	14	3.73	2.71
WPA-80090/4CF	360.0000	0.01	-0.00	-7.39	144.00	1.523	14	3.73	2.71
WPA-80090/4CF	120.0000	0.01	6.40	3.69	144.00	1.523	14	3.73	2.71
WPA-80090/4CF	240.0000	0.01	-16.79	9.69	144.00	1.523	14	3.73	2.71
WPA-80090/4CF	360.0000	0.01	0.00	-19.39	144.00	1.523	14	3.73	2.71
WPA-80090/4CF	120.0000	0.01	16.79	9.69	144.00	1.523	14	3.73	2.71
Rymsa MG D3-800Tx	240.0000	0.03	-8.13	4.69	144.00	1.523	14	3.57	3.43
Rymsa MG D3-800Tx	360.0000	0.03	0.00	-9.39	144.00	1.523	14	3.57	3.43
Rymsa MG D3-800Tx	120.0000	0.03	8.13	4.69	144.00	1.523	14	3.57	3.43
P65-15-XL-2	240.0000	0.07	-15.05	8.69	144.00	1.523	14	8.54	5.99
P65-15-XL-2	360.0000	0.07	0.00	-17.38	144.00	1.523	14	8.54	5.99
P65-15-XL-2	120.0000	0.07	15.05	8.69	144.00	1.523	14	8.54	5.99
Rohn 15 Foot Sector Frame	240.0000	0.39	-11.59	6.69	144.00	1.523	14	13.90	3.08
Rohn 15 Foot Sector Frame	360.0000	0.39	0.00	-13.39	144.00	1.523	14	13.90	3.08

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Rohn 15 Foot Sector Frame	120.0000	0.39	11.59	6.69	144.00	1.523	14	13.90	3.08
DB980H90E-M w/Mount Pipe	240.0000	0.06	-10.49	6.05	124.00	1.460	13	8.55	7.71
DB980H90E-M w/Mount Pipe	360.0000	0.06	0.00	-12.11	124.00	1.460	13	8.55	7.71
DB980H90E-M w/Mount Pipe	120.0000	0.06	10.49	6.05	124.00	1.460	13	8.55	7.71
Rohn 12 Foot Sector Frame	240.0000	0.36	-10.49	6.05	124.00	1.460	13	12.20	3.08
Rohn 12 Foot Sector Frame	360.0000	0.36	0.00	-12.11	124.00	1.460	13	12.20	3.08
Rohn 12 Foot Sector Frame	120.0000	0.36	10.49	6.05	124.00	1.460	13	12.20	3.08
FD9R6004/2C-3L Diplexer	210.0000	0.00	-10.56	4.41	144.00	1.523	14	0.37	0.08
FD9R6004/2C-3L Diplexer	330.0000	0.00	1.46	-11.35	144.00	1.523	14	0.37	0.08
FD9R6004/2C-3L Diplexer	90.0000	0.00	9.10	6.94	144.00	1.523	14	0.37	0.08
	Sum Weight:	8.43							

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	13.56					
Bracing Weight	15.05					
Total Member Self-Weight	28.61			-6.11	-13.78	
Total Weight	45.90			-6.11	-13.78	
Wind 0 deg - No Ice		0.00	-49.92	-5128.07	-13.79	34.45
Wind 30 deg - No Ice		24.19	-41.91	-4331.87	-2511.27	21.42
Wind 45 deg - No Ice		34.04	-34.04	-3523.11	-3530.79	13.07
Wind 60 deg - No Ice		41.46	-23.94	-2482.43	-4302.88	3.96
Wind 90 deg - No Ice		48.39	-0.00	-6.13	-5008.74	-14.47
Wind 120 deg - No Ice		43.23	24.96	2554.85	-4449.53	-30.27
Wind 135 deg - No Ice		34.04	34.04	3510.86	-3530.77	-33.40
Wind 150 deg - No Ice		24.19	41.91	4319.63	-2511.24	-35.89
Wind 180 deg - No Ice		-0.00	47.88	4946.49	-13.76	-32.63
Wind 210 deg - No Ice		-24.19	41.91	4319.65	2483.72	-21.42
Wind 225 deg - No Ice		-34.04	34.04	3510.89	3503.24	-13.07
Wind 240 deg - No Ice		-43.23	24.96	2554.89	4422.00	-4.18
Wind 270 deg - No Ice		-48.39	0.00	-6.09	4981.19	14.47
Wind 300 deg - No Ice		-41.46	-23.94	-2482.40	4275.31	28.67
Wind 315 deg - No Ice		-34.04	-34.04	-3523.09	3503.21	33.40
Wind 330 deg - No Ice		-24.19	-41.91	-4331.85	2483.69	35.89
Member Ice	9.35					
Total Weight Ice	74.82			-14.87	-39.66	
Wind 0 deg - Ice		0.00	-50.83	-5300.79	-39.68	41.94
Wind 30 deg - Ice		24.90	-43.13	-4518.51	-2639.86	28.63
Wind 45 deg - Ice		35.09	-35.09	-3682.00	-3706.80	19.25
Wind 60 deg - Ice		42.83	-24.73	-2600.80	-4518.61	8.65
Wind 90 deg - Ice		49.80	-0.00	-14.89	-5240.02	-13.50
Wind 120 deg - Ice		44.02	25.41	2628.07	-4617.41	-32.97
Wind 135 deg - Ice		35.09	35.09	3652.23	-3706.77	-38.27

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 150 deg - Ice		24.90	43.13	4488.75	-2639.83	-42.13
Wind 180 deg - Ice		-0.00	49.46	5156.94	-39.64	-40.49
Wind 210 deg - Ice		-24.90	43.13	4488.76	2560.54	-28.63
Wind 225 deg - Ice		-35.09	35.09	3652.25	3627.48	-19.25
Wind 240 deg - Ice		-44.02	25.41	2628.10	4538.11	-8.97
Wind 270 deg - Ice		-49.80	0.00	-14.85	5160.70	13.50
Wind 300 deg - Ice		-42.83	-24.73	-2600.76	4439.27	31.84
Wind 315 deg - Ice		-35.09	-35.09	-3681.97	3627.45	38.27
Wind 330 deg - Ice		-24.90	-43.13	-4518.49	2560.51	42.13
Total Weight	45.90			-6.11	-13.78	
Wind 0 deg - Service		0.00	-28.08	-2881.04	0.10	19.38
Wind 30 deg - Service		13.61	-23.57	-2433.17	-1404.73	12.05
Wind 45 deg - Service		19.14	-19.14	-1978.25	-1978.21	7.35
Wind 60 deg - Service		23.32	-13.47	-1392.86	-2412.51	2.23
Wind 90 deg - Service		27.22	-0.00	0.05	-2809.56	-8.14
Wind 120 deg - Service		24.32	14.04	1440.61	-2495.00	-17.03
Wind 135 deg - Service		19.14	19.14	1978.36	-1978.20	-18.78
Wind 150 deg - Service		13.61	23.57	2433.29	-1404.71	-20.19
Wind 180 deg - Service		-0.00	26.93	2785.90	0.12	-18.36
Wind 210 deg - Service		-13.61	23.57	2433.30	1404.95	-12.05
Wind 225 deg - Service		-19.14	19.14	1978.38	1978.43	-7.35
Wind 240 deg - Service		-24.32	14.04	1440.62	2495.24	-2.35
Wind 270 deg - Service		-27.22	0.00	0.07	2809.78	8.14
Wind 300 deg - Service		-23.32	-13.47	-1392.85	2412.72	16.13
Wind 315 deg - Service		-19.14	-19.14	-1978.23	1978.42	18.78
Wind 330 deg - Service		-13.61	-23.57	-2433.16	1404.94	20.19

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 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

Comb. No.	Description
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

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	188 - 180	Leg	Max Tension	15	1.65	-0.01	0.00
			Max. Compression	19	-3.69	0.00	0.10
			Max. Mx	6	-2.96	-0.09	-0.03
			Max. My	2	-3.38	0.00	0.11
			Max. Vy	14	0.68	-0.00	-0.00
			Max. Vx	10	-0.69	-0.00	0.00
		Diagonal	Max Tension	4	1.09	0.00	0.00
			Max. Compression	12	-1.11	0.00	0.00
			Max. Mx	19	0.83	0.01	-0.00
			Max. My	14	-0.98	0.00	-0.00
			Max. Vy	19	-0.01	0.01	-0.00
			Max. Vx	30	0.00	0.00	0.00
		Top Girt	Max Tension	2	0.43	0.00	0.00
			Max. Compression	15	-0.46	0.00	0.00
			Max. Mx	18	-0.03	-0.04	0.00
			Max. My	34	-0.03	0.00	-0.00
			Max. Vy	18	0.03	0.00	0.00
			Max. Vx	34	0.00	0.00	0.00
T2	180 - 160	Leg	Max Tension	15	13.77	-0.32	-0.01
			Max. Compression	19	-18.62	-0.03	-0.01
			Max. Mx	10	9.48	0.70	-0.00
			Max. My	6	-1.18	-0.01	-0.70
			Max. Vy	10	-0.53	-0.36	-0.00
			Max. Vx	6	0.54	-0.01	0.35
		Diagonal	Max Tension	28	2.95	0.00	0.00
			Max. Compression	28	-2.93	0.00	0.00
			Max. Mx	33	1.84	0.01	-0.00
			Max. My	21	-2.81	0.01	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	33	0.01	0.01	-0.00
			Max. Vx	21	-0.00	0.00	0.00
T3	160 - 140	Leg	Max Tension	5	32.80	-0.46	-0.01
			Max. Compression	19	-42.11	0.52	-0.04
			Max. Mx	15	32.19	0.74	-0.02
			Max. My	11	-2.96	-0.02	-0.70
			Max. Vy	15	-0.67	-0.12	-0.02
			Max. Vx	3	-0.63	-0.00	-0.04
		Diagonal	Max Tension	26	4.68	0.00	0.00
			Max. Compression	26	-4.77	0.00	0.00
			Max. Mx	19	3.68	0.05	-0.00
			Max. My	33	-3.75	0.01	-0.01
			Max. Vy	19	-0.02	0.05	-0.00
			Max. Vx	33	0.00	0.00	0.00
T4	140 - 120	Leg	Max Tension	5	57.79	-0.42	-0.00
			Max. Compression	24	-72.28	0.40	0.04
			Max. Mx	15	40.67	-0.61	-0.02
			Max. My	3	-3.78	-0.02	-0.51
			Max. Vy	32	-0.32	-0.44	-0.05
			Max. Vx	20	-0.32	-0.04	-0.40
		Diagonal	Max Tension	26	6.41	0.00	0.00
			Max. Compression	26	-6.55	0.00	0.00
			Max. Mx	19	4.52	0.07	-0.01
			Max. My	33	-5.05	0.01	-0.01
			Max. Vy	22	0.03	0.07	-0.01
			Max. Vx	33	0.00	0.00	0.00
T5	120 - 100	Leg	Max Tension	5	84.58	-0.24	-0.00
			Max. Compression	24	-105.61	0.49	0.06
			Max. Mx	32	82.04	-0.56	-0.06
			Max. My	20	-9.21	-0.02	-0.47
			Max. Vy	32	0.10	-0.56	-0.06
			Max. Vx	19	0.11	-0.31	-0.44
		Diagonal	Max Tension	34	7.65	0.00	0.00
			Max. Compression	34	-7.61	0.00	0.00
			Max. Mx	21	5.03	0.08	0.01
			Max. My	26	-7.43	0.03	0.01
			Max. Vy	22	0.04	0.08	-0.01
			Max. Vx	33	0.00	0.00	0.00
T6	100 - 80	Leg	Max Tension	22	108.90	-0.35	-0.02
			Max. Compression	24	-135.59	0.63	0.07
			Max. Mx	32	106.94	-0.79	-0.07
			Max. My	20	-12.03	0.00	-0.74
			Max. Vy	32	0.11	-0.79	-0.07
			Max. Vx	2	0.12	-0.24	-0.66
		Diagonal	Max Tension	34	9.08	0.00	0.00
			Max. Compression	34	-9.10	0.00	0.00
			Max. Mx	24	6.50	0.14	0.01
			Max. My	26	-8.70	0.04	0.03
			Max. Vy	22	0.05	0.13	-0.01
			Max. Vx	26	-0.00	0.00	0.00
T7	80 - 60	Leg	Max Tension	22	136.19	-0.23	-0.02
			Max. Compression	24	-168.71	0.42	0.05
			Max. Mx	32	133.79	-1.12	-0.05
			Max. My	20	-14.55	0.14	-0.67
			Max. Vy	32	0.15	-1.12	-0.05
			Max. Vx	2	0.11	-0.25	-0.60
		Diagonal	Max Tension	34	10.11	0.00	0.00
			Max. Compression	34	-10.01	0.00	0.00
			Max. Mx	24	7.14	0.21	0.02
			Max. My	26	-9.61	0.07	0.03
			Max. Vy	22	0.07	0.20	-0.02

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	27	-0.00	0.00	0.00
T8	60 - 40	Leg	Max Tension	22	160.92	-0.14	-0.02
			Max. Compression	24	-200.37	-1.00	0.03
			Max. Mx	32	158.11	-2.38	-0.04
			Max. My	20	-17.24	0.86	-1.05
			Max. Vy	30	0.34	1.89	0.01
			Max. Vx	3	0.14	-0.05	-1.05
		Diagonal	Max Tension	34	10.37	0.00	0.00
			Max. Compression	34	-10.00	0.00	0.00
			Max. Mx	22	6.79	0.23	-0.02
			Max. My	26	-9.08	0.10	0.03
			Max. Vy	22	0.08	0.22	-0.02
			Max. Vx	26	-0.01	0.00	0.00
T9	40 - 20	Leg	Max Tension	22	185.12	2.09	-0.01
			Max. Compression	24	-233.01	-3.22	0.06
			Max. Mx	22	184.81	-5.82	-0.02
			Max. My	20	-19.34	-1.69	-0.98
			Max. Vy	32	0.86	-5.82	-0.06
			Max. Vx	3	-0.11	-0.07	-0.92
		Diagonal	Max Tension	34	12.88	0.00	0.00
			Max. Compression	34	-12.11	0.00	0.00
			Max. Mx	22	7.17	0.26	-0.03
			Max. My	19	-2.17	0.24	-0.03
			Max. Vy	22	0.09	0.26	-0.03
			Max. Vx	19	0.00	0.00	0.00
T10	20 - 0	Leg	Max Tension	5	208.51	-0.95	-0.01
			Max. Compression	24	-265.86	0.00	-0.00
			Max. Mx	30	-243.01	5.95	0.01
			Max. My	20	-21.94	5.06	-2.06
			Max. Vy	32	-1.07	-5.82	-0.06
			Max. Vx	3	-0.29	-0.14	-2.03
		Diagonal	Max Tension	34	15.05	0.00	0.00
			Max. Compression	34	-14.18	0.00	0.00
			Max. Mx	21	4.39	0.40	0.04
			Max. My	26	-14.09	0.30	0.06
			Max. Vy	21	0.11	0.40	0.04
			Max. Vx	26	-0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	267.63	22.33	-12.65
	Max. H_x	13	251.35	26.33	-15.09
	Max. H_z	21	-208.81	-27.64	16.64
	Min. Vert	22	-216.33	-28.81	16.41
	Min. H_x	22	-216.33	-28.81	16.41
	Min. H_z	13	251.35	26.33	-15.09
Leg B	Max. Vert	24	270.80	-21.89	-13.54
	Max. H_x	32	-213.15	28.30	17.17
	Max. H_z	33	-205.63	26.93	17.75
	Min. Vert	15	-213.20	22.77	13.91
	Min. H_x	7	252.45	-25.95	-15.79
	Min. H_z	7	252.45	-25.95	-15.79
Leg A	Max. Vert	19	270.25	0.99	25.72
	Max. H_x	14	15.58	4.36	1.31

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. H_z	2	252.32	0.80	30.37
	Min. Vert	27	-213.71	-0.91	-33.11
	Min. H_x	6	15.58	-4.34	1.31
	Min. H_z	27	-213.71	-0.91	-33.11

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	45.90	0.00	-0.00	-6.11	-13.78	0.00
Dead+Wind 0 deg - No Ice	45.90	0.00	-49.91	-5139.97	-13.88	34.50
Dead+Wind 30 deg - No Ice	45.90	24.19	-41.90	-4341.90	-2517.06	21.45
Dead+Wind 45 deg - No Ice	45.90	34.03	-34.03	-3531.26	-3538.91	13.09
Dead+Wind 60 deg - No Ice	45.90	41.46	-23.94	-2488.15	-4312.79	3.96
Dead+Wind 90 deg - No Ice	45.90	48.38	0.00	-6.12	-5020.33	-14.49
Dead+Wind 120 deg - No Ice	45.90	43.23	24.96	2560.73	-4459.88	-30.31
Dead+Wind 135 deg - No Ice	45.90	34.03	34.03	3518.95	-3539.04	-33.44
Dead+Wind 150 deg - No Ice	45.90	24.19	41.90	4329.56	-2517.15	-35.93
Dead+Wind 180 deg - No Ice	45.90	-0.00	47.87	4957.89	-13.84	-32.67
Dead+Wind 210 deg - No Ice	45.90	-24.19	41.90	4329.63	2489.49	-21.45
Dead+Wind 225 deg - No Ice	45.90	-34.03	34.03	3519.02	3511.40	-13.09
Dead+Wind 240 deg - No Ice	45.90	-43.23	24.96	2560.81	4432.26	-4.18
Dead+Wind 270 deg - No Ice	45.90	-48.38	0.00	-6.09	4992.71	14.49
Dead+Wind 300 deg - No Ice	45.90	-41.46	-23.94	-2488.17	4285.14	28.71
Dead+Wind 315 deg - No Ice	45.90	-34.03	-34.03	-3531.29	3511.23	33.44
Dead+Wind 330 deg - No Ice	45.90	-24.19	-41.90	-4341.93	2489.34	35.93
Dead+Ice+Temp	74.82	-0.00	0.00	-14.88	-39.68	0.00
Dead+Wind 0 deg+Ice+Temp	74.82	0.00	-50.82	-5319.53	-39.87	42.06
Dead+Wind 30 deg+Ice+Temp	74.82	24.89	-43.12	-4534.48	-2649.15	28.71
Dead+Wind 45 deg+Ice+Temp	74.82	35.08	-35.08	-3694.98	-3719.83	19.30
Dead+Wind 60 deg+Ice+Temp	74.82	42.82	-24.72	-2609.95	-4534.51	8.67
Dead+Wind 90 deg+Ice+Temp	74.82	49.79	0.00	-14.91	-5258.50	-13.56
Dead+Wind 120 deg+Ice+Temp	74.82	44.01	25.41	2637.31	-4633.75	-33.08
Dead+Wind 135 deg+Ice+Temp	74.82	35.08	35.08	3665.08	-3719.96	-38.38
Dead+Wind 150 deg+Ice+Temp	74.82	24.89	43.12	4504.53	-2649.25	-42.26
Dead+Wind 180 deg+Ice+Temp	74.82	-0.00	49.45	5175.11	-39.85	-40.61
Dead+Wind 210 deg+Ice+Temp	74.82	-24.89	43.12	4504.61	2569.59	-28.71
Dead+Wind 225 deg+Ice+Temp	74.82	-35.09	35.08	3665.17	3640.33	-19.30
Dead+Wind 240 deg+Ice+Temp	74.82	-44.01	25.41	2637.39	4554.14	-8.99
Dead+Wind 270 deg+Ice+Temp	74.82	-49.79	0.00	-14.89	5178.93	13.56
Dead+Wind 300 deg+Ice+Temp	74.82	-42.82	-24.72	-2609.99	4454.88	31.94
Dead+Wind 315 deg+Ice+Temp	74.82	-35.08	-35.08	-3695.04	3640.17	38.38
Dead+Wind 330 deg+Ice+Temp	74.82	-24.89	-43.12	-4534.52	2569.44	42.26
Dead+Wind 0 deg - Service	45.90	0.00	-28.08	-2893.91	-13.83	19.40
Dead+Wind 30 deg - Service	45.90	13.61	-23.57	-2445.01	-1421.90	12.06
Dead+Wind 45 deg - Service	45.90	19.14	-19.14	-1989.02	-1996.70	7.36
Dead+Wind 60 deg - Service	45.90	23.32	-13.46	-1402.28	-2432.01	2.23
Dead+Wind 90 deg - Service	45.90	27.21	0.00	-6.13	-2829.99	-8.16
Dead+Wind 120 deg - Service	45.90	24.32	14.04	1437.74	-2514.71	-17.04
Dead+Wind 135 deg - Service	45.90	19.14	19.14	1976.75	-1996.73	-18.80
Dead+Wind 150 deg - Service	45.90	13.61	23.57	2432.73	-1421.92	-20.21
Dead+Wind 180 deg - Service	45.90	-0.00	26.93	2786.16	-13.81	-18.38
Dead+Wind 210 deg - Service	45.90	-13.61	23.57	2432.75	1394.30	-12.06
Dead+Wind 225 deg - Service	45.90	-19.14	19.14	1976.78	1969.11	-7.37
Dead+Wind 240 deg - Service	45.90	-24.32	14.04	1437.77	2487.10	-2.35
Dead+Wind 270 deg - Service	45.90	-27.21	0.00	-6.11	2802.37	8.16

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 300 deg - Service	45.90	-23.32	-13.46	-1402.28	2404.38	16.15
Dead+Wind 315 deg - Service	45.90	-19.14	-19.14	-1989.03	1969.06	18.81
Dead+Wind 330 deg - Service	45.90	-13.61	-23.57	-2445.01	1394.24	20.21

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-45.90	0.00	-0.00	45.90	0.00	0.000%
2	0.00	-45.90	-49.92	-0.00	45.90	49.91	0.009%
3	24.19	-45.90	-41.91	-24.19	45.90	41.90	0.010%
4	34.04	-45.90	-34.04	-34.03	45.90	34.03	0.010%
5	41.46	-45.90	-23.94	-41.46	45.90	23.94	0.010%
6	48.39	-45.90	-0.00	-48.38	45.90	-0.00	0.010%
7	43.23	-45.90	24.96	-43.23	45.90	-24.96	0.009%
8	34.04	-45.90	34.04	-34.03	45.90	-34.03	0.009%
9	24.19	-45.90	41.91	-24.19	45.90	-41.90	0.010%
10	-0.00	-45.90	47.88	0.00	45.90	-47.87	0.010%
11	-24.19	-45.90	41.91	24.19	45.90	-41.90	0.010%
12	-34.04	-45.90	34.04	34.03	45.90	-34.03	0.009%
13	-43.23	-45.90	24.96	43.23	45.90	-24.96	0.009%
14	-48.39	-45.90	0.00	48.38	45.90	-0.00	0.010%
15	-41.46	-45.90	-23.94	41.46	45.90	23.94	0.010%
16	-34.04	-45.90	-34.04	34.03	45.90	34.03	0.010%
17	-24.19	-45.90	-41.91	24.19	45.90	41.90	0.010%
18	0.00	-74.82	0.00	0.00	74.82	-0.00	0.000%
19	0.00	-74.82	-50.83	-0.00	74.82	50.82	0.012%
20	24.90	-74.82	-43.13	-24.89	74.82	43.12	0.012%
21	35.09	-74.82	-35.09	-35.08	74.82	35.08	0.012%
22	42.83	-74.82	-24.73	-42.82	74.82	24.72	0.013%
23	49.80	-74.82	-0.00	-49.79	74.82	-0.00	0.012%
24	44.02	-74.82	25.41	-44.01	74.82	-25.41	0.012%
25	35.09	-74.82	35.09	-35.08	74.82	-35.08	0.012%
26	24.90	-74.82	43.13	-24.89	74.82	-43.12	0.012%
27	-0.00	-74.82	49.46	0.00	74.82	-49.45	0.012%
28	-24.90	-74.82	43.13	24.89	74.82	-43.12	0.012%
29	-35.09	-74.82	35.09	35.09	74.82	-35.08	0.012%
30	-44.02	-74.82	25.41	44.01	74.82	-25.41	0.012%
31	-49.80	-74.82	0.00	49.79	74.82	-0.00	0.012%
32	-42.83	-74.82	-24.73	42.82	74.82	24.72	0.012%
33	-35.09	-74.82	-35.09	35.08	74.82	35.08	0.012%
34	-24.90	-74.82	-43.13	24.89	74.82	43.12	0.012%
35	0.00	-45.90	-28.08	-0.00	45.90	28.08	0.007%
36	13.61	-45.90	-23.57	-13.61	45.90	23.57	0.007%
37	19.14	-45.90	-19.14	-19.14	45.90	19.14	0.007%
38	23.32	-45.90	-13.47	-23.32	45.90	13.46	0.007%
39	27.22	-45.90	-0.00	-27.21	45.90	-0.00	0.007%
40	24.32	-45.90	14.04	-24.32	45.90	-14.04	0.007%
41	19.14	-45.90	19.14	-19.14	45.90	-19.14	0.007%
42	13.61	-45.90	23.57	-13.61	45.90	-23.57	0.007%
43	-0.00	-45.90	26.93	0.00	45.90	-26.93	0.007%
44	-13.61	-45.90	23.57	13.61	45.90	-23.57	0.007%
45	-19.14	-45.90	19.14	19.14	45.90	-19.14	0.007%
46	-24.32	-45.90	14.04	24.32	45.90	-14.04	0.007%
47	-27.22	-45.90	0.00	27.21	45.90	-0.00	0.007%
48	-23.32	-45.90	-13.47	23.32	45.90	13.46	0.007%
49	-19.14	-45.90	-19.14	19.14	45.90	19.14	0.007%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
50	-13.61	-45.90	-23.57	13.61	45.90	23.57	0.007%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00014117	0.00032358
3	Yes	4	0.00015059	0.00034491
4	Yes	4	0.00015666	0.00035859
5	Yes	4	0.00015907	0.00036405
6	Yes	4	0.00015054	0.00034477
7	Yes	4	0.00014116	0.00032351
8	Yes	4	0.00014417	0.00033050
9	Yes	4	0.00015097	0.00034464
10	Yes	4	0.00015908	0.00036410
11	Yes	4	0.00015056	0.00034489
12	Yes	4	0.00014623	0.00033064
13	Yes	4	0.00014110	0.00032348
14	Yes	4	0.00015052	0.00034484
15	Yes	4	0.00015909	0.00036419
16	Yes	4	0.00015662	0.00035858
17	Yes	4	0.00015098	0.00034474
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00023744	0.00053944
20	Yes	4	0.00024726	0.00056106
21	Yes	4	0.00025368	0.00057520
22	Yes	4	0.00025625	0.00058085
23	Yes	4	0.00024713	0.00056066
24	Yes	4	0.00023740	0.00053907
25	Yes	4	0.00024037	0.00054577
26	Yes	4	0.00024697	0.00056030
27	Yes	4	0.00025621	0.00058078
28	Yes	4	0.00024706	0.00056068
29	Yes	4	0.00024030	0.00054595
30	Yes	4	0.00023712	0.00053880
31	Yes	4	0.00024694	0.00056057
32	Yes	4	0.00025620	0.00058106
33	Yes	4	0.00025352	0.00057511
34	Yes	4	0.00024699	0.00056067
35	Yes	4	0.00000001	0.00033092
36	Yes	4	0.00000001	0.00034268
37	Yes	4	0.00000001	0.00035036
38	Yes	4	0.00000001	0.00035346
39	Yes	4	0.00000001	0.00034255
40	Yes	4	0.00000001	0.00033079
41	Yes	4	0.00000001	0.00033459
42	Yes	4	0.00000001	0.00034239
43	Yes	4	0.00000001	0.00035341
44	Yes	4	0.00000001	0.00034255
45	Yes	4	0.00000001	0.00033466
46	Yes	4	0.00000001	0.00033076
47	Yes	4	0.00000001	0.00034260
48	Yes	4	0.00000001	0.00035356
49	Yes	4	0.00000001	0.00035035
50	Yes	4	0.00000001	0.00034256

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	188 - 180	6.342	35	0.3008	0.0265
T2	180 - 160	5.834	40	0.2984	0.0263
T3	160 - 140	4.597	40	0.2714	0.0246
T4	140 - 120	3.500	40	0.2349	0.0232
T5	120 - 100	2.554	40	0.1957	0.0202
T6	100 - 80	1.755	40	0.1595	0.0158
T7	80 - 60	1.121	40	0.1204	0.0119
T8	60 - 40	0.651	40	0.0853	0.0090
T9	40 - 20	0.321	40	0.0530	0.0059
T10	20 - 0	0.102	40	0.0272	0.0028

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
193.50	BCD-87010__	35	6.342	0.3008	0.0265	726317
188.00	(3) RR90-17-02DP w/Mount Pipe	35	6.342	0.3008	0.0265	726317
177.00	APXV18-206517S-C w/ mounting hardware	40	5.644	0.2962	0.0260	139831
168.00	7770 Panel Antenna	40	5.080	0.2848	0.0250	44699
153.00	APX16DWV-16DWV-S-E-ACU w/ Mount	40	4.195	0.2590	0.0243	29154
144.00	WPA-80090/4CF	40	3.706	0.2425	0.0236	31117
124.00	(2) DB980H90E-M w/Mount Pipe	40	2.732	0.2033	0.0210	33789

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	188 - 180	11.591	24	0.5434	0.0553
T2	180 - 160	10.675	24	0.5394	0.0554
T3	160 - 140	8.438	24	0.4927	0.0540
T4	140 - 120	6.442	24	0.4288	0.0510
T5	120 - 100	4.711	24	0.3593	0.0443
T6	100 - 80	3.239	24	0.2939	0.0342
T7	80 - 60	2.068	24	0.2224	0.0256
T8	60 - 40	1.199	24	0.1577	0.0192
T9	40 - 20	0.588	24	0.0978	0.0126
T10	20 - 0	0.186	24	0.0502	0.0058

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
193.50	BCD-87010__	24	11.591	0.5434	0.0553	431645
188.00	(3) RR90-17-02DP w/Mount Pipe	24	11.591	0.5434	0.0553	431645
177.00	APXV18-206517S-C w/ mounting hardware	24	10.332	0.5356	0.0554	79686
168.00	7770 Panel Antenna	24	9.314	0.5160	0.0549	25257
153.00	APX16DWV-16DWV-S-E-ACU w/ Mount	24	7.707	0.4712	0.0532	16443
144.00	WPA-80090/4CF	24	6.819	0.4423	0.0518	17532
124.00	(2) DB980H90E-M w/Mount Pipe	24	5.037	0.3729	0.0460	19044

Bolt Design Data

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
T1	188	Leg	A325N	0.6250	4	0.18	13.49	0.014 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	1.09	6.12	0.177 ✓	1.333	Member Bearing
T2	180	Leg	A325N	0.7500	4	0.96	19.44	0.049 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2.95	6.12	0.482 ✓	1.333	Member Bearing
T3	160	Leg	A325N	0.8750	4	4.76	26.46	0.180 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	4.77	6.44	0.741 ✓	1.333	Bolt Shear
T4	140	Leg	A325N	1.0000	4	10.19	34.56	0.295 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	6.55	6.44	1.016 ✓	1.333	Bolt Shear
T5	120	Leg	A325N	1.0000	6	11.10	34.56	0.321 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	7.65	9.28	0.825 ✓	1.333	Bolt Shear
T6	100	Leg	A325N	1.0000	8	11.93	34.56	0.345 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	9.10	9.28	0.981 ✓	1.333	Bolt Shear
T7	80	Leg	A325N	1.0000	8	15.36	34.56	0.444 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	10.11	9.28	1.089 ✓	1.333	Bolt Shear
T8	60	Leg	A325N	1.0000	8	18.69	34.56	0.541 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	10.37	9.28	1.118 ✓	1.333	Bolt Shear
T9	40	Leg	A325N	1.0000	8	21.82	34.56	0.631 ✓	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	12.88	12.70	1.014 ✓	1.333	Member Bearing
T10	20	Leg	A325N	1.0000	10	20.11	34.56	0.582 ✓	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	15.05	13.25	1.135 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	188 - 180	ROHN 2.5 STD	8.00	4.00	50.7 K=1.00	24.247	1.7040	-3.69	41.32	0.089 ✓
T2	180 - 160	ROHN 2.5 STD	20.03	5.01	63.4 K=1.00	22.123	1.7040	-18.62	37.70	0.494 ✓
T3	160 - 140	ROHN 3 EH	20.04	6.68	70.5 K=1.00	20.840	3.0159	-42.11	62.85	0.670 ✓
T4	140 - 120	ROHN 4 EH	20.04	6.68	54.3 K=1.00	23.670	4.4074	-72.28	104.32	0.693 ✓
T5	120 - 100	ROHN 5 EH	20.04	6.68	43.6 K=1.00	25.320	6.1120	-105.61	154.75	0.682 ✓
T6	100 - 80	ROHN 6 EHS	20.04	10.02	54.0 K=1.00	23.712	6.7133	-135.59	159.18	0.852 ✓
T7	80 - 60	ROHN 6 EH	20.03	10.02	54.8 K=1.00	23.592	8.4049	-168.71	198.29	0.851 ✓
T8	60 - 40	ROHN 8 EHS	20.04	10.02	41.2 K=1.00	25.665	9.7193	-200.37	249.44	0.803 ✓
T9	40 - 20	ROHN 8 EH	20.03	10.02	41.8 K=1.00	25.583	12.7627	-233.01	326.51	0.714 ✓
T10	20 - 0	ROHN 8 EH	20.03	10.02	41.8 K=1.00	25.582	12.7627	-265.86	326.50	0.814 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	188 - 180	L1 3/4x1 3/4x3/16	7.70	3.57	124.9 K=1.00	9.570	0.6211	-1.11	5.94	0.187 ✓
T2	180 - 160	L1 3/4x1 3/4x3/16	9.69	4.71	164.6 K=1.00	5.512	0.6211	-2.93	3.42	0.855 ✓
T3	160 - 140	L2 1/2x2 1/2x1/4	12.24	6.02	147.1 K=1.00	6.905	1.1900	-4.77	8.22	0.581 ✓
T4	140 - 120	L3x3x1/4	14.07	6.89	139.6 K=1.00	7.663	1.4400	-6.55	11.04	0.593 ✓
T5	120 - 100	L3x3x1/4	15.94	7.76	157.4 K=1.00	6.031	1.4400	-7.61	8.69	0.877 ✓
T6	100 - 80	L3 1/2x3 1/2x1/4	19.21	9.44	163.2 K=1.00	5.603	1.6900	-9.10	9.47	0.961 ✓
T7	80 - 60	L4x4x5/16	20.93	10.29	156.1 K=1.00	6.132	2.4000	-10.01	14.72	0.680 ✓
T8	60 - 40	L4x4x5/16	22.87	11.20	170.0 K=1.00	5.169	2.4000	-9.47	12.41	0.763 ✓
T9	40 - 20	L4x4x5/16	23.81	11.63	176.4 K=1.00	4.797	2.4000	-12.11	11.51	1.052 ✓
T10	20 - 0	L4x4x3/8	25.58	12.53	190.8	4.104	2.8600	-14.18	11.74	1.208 ✓

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
					K=1.00					✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	188 - 180	L3x3x1/4	6.58	6.34	125.2 K=0.97	9.519	1.4400	-0.46	13.71	0.034 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	188 - 180	ROHN 2.5 STD	8.00	4.00	50.7	30.000	1.7040	1.65	51.12	0.032 ✓
T2	180 - 160	ROHN 2.5 STD	20.03	5.01	63.4	30.000	1.7040	13.77	51.12	0.269 ✓
T3	160 - 140	ROHN 3 EH	20.04	6.68	70.5	30.000	3.0159	32.80	90.48	0.363 ✓
T4	140 - 120	ROHN 4 EH	20.04	6.68	54.3	30.000	4.4074	57.79	132.22	0.437 ✓
T5	120 - 100	ROHN 5 EH	20.04	6.68	43.6	30.000	6.1120	84.58	183.36	0.461 ✓
T6	100 - 80	ROHN 6 EHS	20.04	10.02	54.0	30.000	6.7133	108.90	201.40	0.541 ✓
T7	80 - 60	ROHN 6 EH	20.03	10.02	54.8	30.000	8.4049	136.19	252.15	0.540 ✓
T8	60 - 40	ROHN 8 EHS	20.04	10.02	41.2	30.000	9.7193	160.92	291.58	0.552 ✓
T9	40 - 20	ROHN 8 EH	20.03	10.02	41.8	30.000	12.7627	185.12	382.88	0.483 ✓
T10	20 - 0	ROHN 8 EH	20.03	10.02	41.8	30.000	12.7627	208.51	382.88	0.545 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	188 - 180	L1 3/4x1 3/4x3/16	7.70	3.57	82.9	29.000	0.3604	1.09	10.45	0.104 ✓
T2	180 - 160	L1 3/4x1 3/4x3/16	9.69	4.71	108.3	29.000	0.3604	2.95	10.45	0.282 ✓
T3	160 - 140	L2 1/2x2 1/2x1/4	12.24	6.02	96.0	29.000	0.7519	4.68	21.80	0.214 ✓
T4	140 - 120	L3x3x1/4	14.07	6.89	90.6	32.500	0.9394	6.41	30.53	0.210 ✓
T5	120 - 100	L3x3x1/4	15.94	7.76	102.0	32.500	0.9159	7.65	29.77	0.257 ✓
T6	100 - 80	L3 1/2x3 1/2x1/4	19.21	9.44	105.5	32.500	1.1034	9.08	35.86	0.253 ✓
T7	80 - 60	L4x4x5/16	20.93	10.29	101.0	32.500	1.5949	10.11	51.84	0.195 ✓
T8	60 - 40	L4x4x5/16	22.87	11.20	109.8	32.500	1.5949	10.37	51.84	0.200 ✓
T9	40 - 20	L4x4x5/16	24.68	12.06	118.1	32.500	1.5949	12.88	51.84	0.248 ✓
T10	20 - 0	L4x4x3/8	26.50	12.99	128.1	32.500	1.8989	15.05	61.71	0.244 ✓

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	188 - 180	L3x3x1/4	6.58	6.34	81.8	21.600	1.4400	0.43	31.10	0.014 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	188 - 180	Leg	ROHN 2.5 STD	3	-3.69	55.08	6.7	Pass
T2	180 - 160	Leg	ROHN 2.5 STD	21	-18.62	50.25	37.0	Pass
T3	160 - 140	Leg	ROHN 3 EH	48	-42.11	83.78	50.3	Pass
T4	140 - 120	Leg	ROHN 4 EH	68	-72.28	139.06	52.0	Pass
T5	120 - 100	Leg	ROHN 5 EH	89	-105.61	206.28	51.2	Pass
T6	100 - 80	Leg	ROHN 6 EHS	110	-135.59	212.19	63.9	Pass
T7	80 - 60	Leg	ROHN 6 EH	125	-168.71	264.32	63.8	Pass
T8	60 - 40	Leg	ROHN 8 EHS	140	-200.37	332.51	60.3	Pass
T9	40 - 20	Leg	ROHN 8 EH	155	-233.01	435.24	53.5	Pass
T10	20 - 0	Leg	ROHN 8 EH	170	-265.86	435.22	61.1	Pass
T1	188 - 180	Diagonal	L1 3/4x1 3/4x3/16	12	-1.11	7.92	14.0	Pass
T2	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	27	-2.93	4.56	64.2	Pass
T3	160 - 140	Diagonal	L2 1/2x2 1/2x1/4	51	-4.77	10.95	43.6	Pass
T4	140 - 120	Diagonal	L3x3x1/4	72	-6.55	14.71	55.6 (b) 44.5 76.3 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T5	120 - 100	Diagonal	L3x3x1/4	94	-7.61	11.58	65.8	Pass
T6	100 - 80	Diagonal	L3 1/2x3 1/2x1/4	115	-9.10	12.62	72.1	Pass
T7	80 - 60	Diagonal	L4x4x5/16	130	-10.01	19.62	73.6 (b) 51.0	Pass
T8	60 - 40	Diagonal	L4x4x5/16	145	-9.47	16.54	81.7 (b) 57.3	Pass
T9	40 - 20	Diagonal	L4x4x5/16	166	-12.11	15.35	83.8 (b) 78.9	Pass
T10	20 - 0	Diagonal	L4x4x3/8	181	-14.18	15.64	90.6	Pass
T1	188 - 180	Top Girt	L3x3x1/4	6	-0.46	18.27	2.5	Pass
							Summary	
						Leg (T6)	63.9	Pass
						Diagonal (T10)	90.6	Pass
						Top Girt (T1)	2.5	Pass
						Bolt Checks	85.2	Pass
						RATING =	**90.6**	**Pass**

ANCHOR BOLT ANALYSIS

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	Uplift := 216·kips	*user input*
Shear:	Shear := 33·kips	*user input*
Compression:	Compression := 271·kips	*user input*

Anchor Bolt Data:

Use ASTM A354 Gr. BC

Number of Anchor Bolts = N	N := 10	*user input*	
Bolt Ultimate Strength:	F_u := 125·ksi	*user input*	
Bolt Yield Strength:	Fy := 93.75·ksi	*user input*	
Bolt Modulus:	E := 29000·ksi	*user input*	
Thickness of Anchor Bolts	D := 1in	*user input*	
Threads per Inch:	n := 8	*user input*	
Coefficient of Friction:	μ := 0.55	*user input*	(for baseplate with grout ASCE 10-97)

Anchor Bolt Area:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4}\cdot D^2 \qquad A_g = 0.785\cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4}\cdot\left(D - \frac{0.9743\cdot in}{n}\right)^2 \qquad A_n = 0.606\cdot in^2$$

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$AllowableTension := 1.333\cdot\left(0.33\cdot A_g\cdot F_u\right) \qquad AllowableTension = 43.2\cdot kips$$

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{net.area} := 1.333\cdot\left(0.60\cdot A_n\cdot Fy\right) \qquad F_{net.area} = 45.4\cdot kips$$

Note: 1.333 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 21.6\cdot kips$$

Check Stresses:

$$\frac{MaxTension}{F_{net.area}} = 0.48$$

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

Condition1 = "OK"

Check Anchor Bolt Area:

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

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 3.1 \cdot in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 1.1 \cdot in^2$$

Provided Area:

$$A_{sprovided} := A_n \cdot N \qquad A_{sprovided} = 6.1 \cdot in^2$$

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed"\right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.5$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed"\right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.2$$

Condition3 = "OK"

FOUNDATION ANALYSIS

DEFINE VARIABLES:

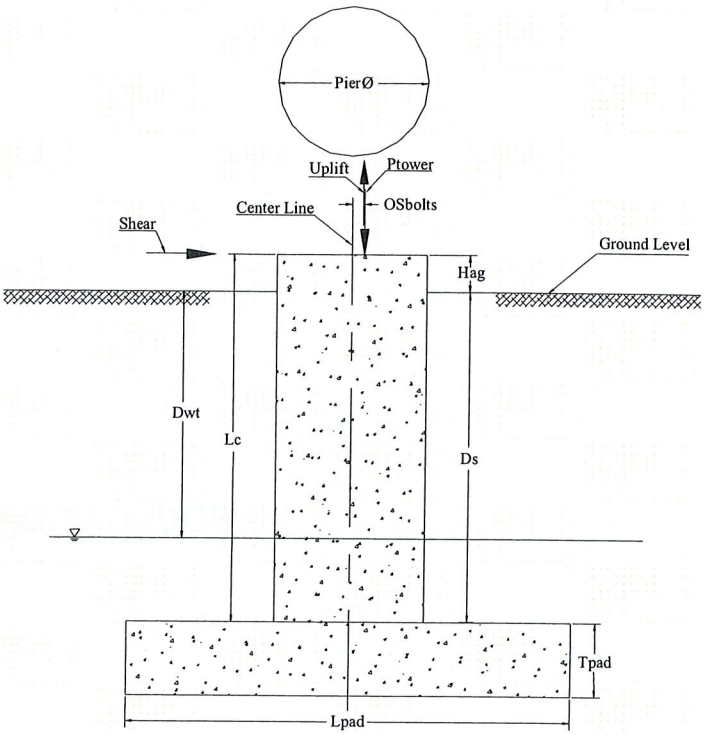
Steel Reinf. Yield Strength: $f_y := 60 \cdot ksi$

Concrete Compressive Strength: $f'_c := 4 \cdot ksi$

Max Uplift Force of Tower: $Uplift := 216 \cdot kip$

Max Shear at Base of Tower: $Shear := 33 \cdot kip$

Max Compressive Force of Tower: $P_{Tower} := 271 \cdot kip$



Diameter of Pier: $Pier\phi := 4.5 \cdot ft$

Length of Pier: $L_c := 12.0 \cdot ft$

Height of Pier Above Grade: $H_{ag} := 0.5 \cdot ft$

Length of Pad: $L_{Pad} := 11.75 \cdot ft$

Thickness of Pad: $T_{Pad} := 2.5 \cdot ft$

Distance to Water Table: $D_{wt} := 20 \cdot ft$

NOTE: SET Dwt TO A VALUE GREATER THAN TOTAL DEPTH OF PAD IF WATER TABLE DOES NOT AFFECT FOOTING

Eccentricity of Anchor Bolts from Center Line of Pier: $OS_{bolts} := 0 \cdot in$

Diameter of Reinforcing Bars in Pad: $d_{bar} := 0.875 \cdot in$

$\gamma_s := 100 \cdot \frac{lb}{ft^3}$ $\gamma_c := 150 \cdot \frac{lb}{ft^3}$ $\gamma_w := 62.4 \cdot \frac{lb}{ft^3}$

Soil Internal Friction Angle: $\phi := 30 \cdot deg$

Allowable Soil Pressure: $q_u := 4 \cdot ksf$

Active Pressure of Soil Acting along Length of Pier: $K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)}$ $P_{Active} := \frac{1}{2} \cdot (L_c + T_{Pad})^2 \cdot Pier\phi \cdot \gamma_s \cdot K_a$ $P_{Active} = 15.77 \cdot kip$

Passive Pressure of Soil Acting along Length of Pier: $K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)}$ $P_{Passive} := \frac{1}{2} \cdot (L_c + T_{Pad})^2 \cdot Pier\phi \cdot \gamma_s \cdot K_p$ $P_{Passive} = 141.92 \cdot kip$

Distance from Grade to Bottom of Pier: $D_s := L_c - H_{ag}$ $D_s = 11.5\,ft$

Area and Volume of Pier: $A_c := \frac{\pi \cdot Pier\phi^2}{4}$ $V_c := A_c \cdot L_c$ $V_c = 190.85\,ft^3$

Area and Volume of Pad: $A_p := L_{Pad}^2$ $V_p := T_{Pad} \cdot A_p$ $V_p = 345.16\,ft^3$

ALLOWABLE SOIL PRESSURE

Assume water table is below bottom of footing

$D_{wtp} := if\left[\left(D_s + T_{Pad}\right) > D_{wt}, T_{Pad}, 0\cdot ft\right]$ $D_{wtp} = 0\,ft$

$W_p := \left(V_p\cdot\gamma_c\right) - D_{wtp}\cdot A_p\cdot\gamma_w$ $W_p = 51.77\cdot kip$

$D_{wtc} := if\left[D_s < D_{wt}, 0\cdot ft, \left(D_s - D_{wt}\right)\right]$ $D_{wtc} = 0\,ft$

$W_c := \left(V_c\cdot\gamma_c\right) - D_{wtc}\cdot A_c\cdot\gamma_w$ $W_c = 28.63\cdot kip$

$W_s := \left[\left(D_s\right)\cdot\left(A_p - A_c\right)\cdot\gamma_s\right]$ $W_s = 140.48\cdot kip$

$P_{Total} := W_p + W_c + W_s + P_{Tower}$ $P_{Total} = 491.88\cdot kip$

$q_{gr} := \frac{P_{Total}}{A_p}$ $q_{gr} = 3.56\cdot ksf$

$q_n := q_{gr} - \left(D_s + T_{Pad}\right)\cdot\gamma_s$ $q_n = 2.16\cdot ksf$

$SoilPressure := if\left(q_n < q_u, \text{"Okay"}, \text{"No Good"}\right)$

SoilPressure = "Okay"

PUNCHING SHEAR:

Critical section is located at a distance d/2 from the face of Pier

$$p_u := \left(\frac{1.3\cdot P_{Tower} + V_c\cdot\gamma_c}{L_{Pad}^{\,2}}\right) + \left[\frac{Shear\cdot\left(L_c + T_{Pad}\right) + P_{Tower}\cdot OS_{bolts} + \left(P_{Active} - P_{Passive}\right)\cdot\frac{L_c + T_{Pad}}{3}}{\frac{1}{6}\cdot L_{Pad}^{\,3}}\right]\cdot 1.333$$

$p_u = 2.11\cdot ksf$

$d := T_{Pad} - \left(3\cdot in + d_{bar}\right)$ $d = 2.18\,ft$

$b_o := \left(Pier\phi + d\right)\cdot\pi$ $b_o = 20.98\,ft$

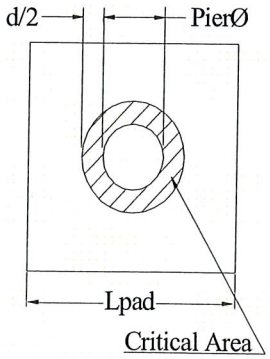
$$Aout_{bo} := L_{Pad}^{\,2} - \frac{\pi\cdot\left(Pier\phi + d\right)^2}{4}$$

$Aout_{bo} = 103.05\,ft^2$

$V_u := Aout_{bo}\cdot p_u$ $V_u = 217.65\cdot kip$

$$\phi V_c := .85\cdot 4\cdot\sqrt{f'_c\cdot\frac{lb}{in^2}}\cdot b_o\cdot d \qquad \phi V_c = 1.41\times 10^3\cdot kip$$

$PunchingShear := if\left(V_u < \phi V_c, \text{"Okay"}, \text{"No Good "}\right)$ PunchingShear = "Okay"

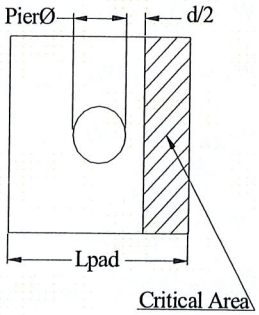


BEAM SHEAR:

Critical section is located at a distance d/2 from the face of the Pier

$V_u := p_u \cdot L_{Pad} \cdot \left(\frac{L_{Pad} - Pier\phi}{2} - \frac{d}{2} \right)$ $V_u = 62.95 \cdot kip$

$\phi V_c := .85 \cdot 2 \cdot \sqrt{f'_c \cdot \frac{lb}{in^2}} \cdot L_{Pad} \cdot d$ $\phi V_c = 396.05 \cdot kip$



BeamShear := if($V_u < \phi V_c$, "Okay", "No Good ")

BeamShear = "Okay"

BENDING:

Critical section extends across width of footing at the face of Pier

$A_{bar} := 0.875 \cdot in^2$ NoOfBar := 13 *user input*

$As_{provided} := NoOfBar \cdot A_{bar}$ $As_{provided} = 11.38 \cdot in^2$

$M_{Req} := p_u \cdot \frac{5}{6} \cdot L_{Pad} \cdot \left(\frac{L_{Pad} - Pier\phi}{2} \right)^2 \cdot \frac{1}{2}$

$M_{Req} = 135.88 \cdot kip \cdot ft$

$a := \frac{As_{provided} \cdot f_y}{.85 \cdot f'_c \cdot L_{Pad}}$

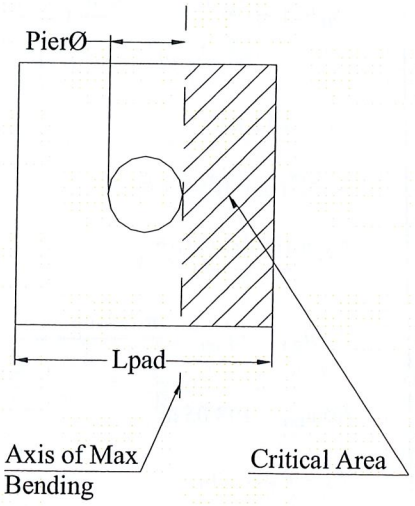
$a = 1.42 \cdot in$

$M_{Avail} := 0.9 \cdot As_{provided} \cdot f_y \cdot \left(d - \frac{a}{2} \right)$

$M_{Avail} = 1.3 \times 10^3 \cdot kip \cdot ft$

Bending := if($M_{Avail} > M_{Req}$, "Okay", "No Good")

Bending = "Okay"



CHECK UPLIFT:

$Soil_1 := \left[(D_s)\cdot\left(L_{Pad}^2 - A_c\right)\cdot\gamma_s\right]$ $Soil_1 = 140.48\cdot kip$ Soil volume above footing

$Soil_2 := 4\cdot\left[(D_s)^2\cdot L_{Pad}\cdot\frac{\tan(\phi)}{2}\right]\cdot\gamma_s$ $Soil_2 = 179.43\cdot kip$ Soil wedge at back face of footing

$Soil_3 := 4\cdot\left[(D_s)^3\cdot\frac{\tan(\phi)^2}{3}\right]\cdot\gamma_s$ $Soil_3 = 67.59\cdot kip$

$WT_{soil} := Soil_1 + Soil_2 + Soil_3$ $WT_{soil} = 387.51\cdot kip$

$WT_{conc} := W_p + W_c$ $WT_{conc} = 80.4\cdot kip$

$Case_1 := \frac{WT_{soil}}{2.0} + \frac{WT_{conc}}{1.25}$ $Case_1 = 258.08\cdot kip$

$Case_2 := \frac{WT_{soil} + WT_{conc}}{2.0}$ $Case_2 = 233.96\cdot kip$

$UpliftCheck := \begin{cases} \text{"OK"} & \text{if } Case_1 \geq Uplift \wedge Case_2 \geq Uplift \\ \text{"No Good"} & \text{otherwise} \end{cases}$ UpliftCheck = "OK"

$UpLiftSafetyFactor_{prov} := \frac{WT_{soil} + WT_{conc}}{Uplift}$ $UpLiftSafetyFactor_{prov} = 2.17$

CHECK OVERTURNING MOMENT:

$SafetyFactor_{req} := 2.0$

$OTM := Shear\cdot\left(L_c + T_{Pad}\right) + Uplift\cdot\left(\frac{L_{Pad}}{2} - OS_{bolts}\right) + P_{Active}\cdot\frac{L_c + T_{Pad}}{3}$

$OTM = 1.82\times 10^3\cdot kip\cdot ft$

$RM := \left(P_{Tower}\right)\cdot\left(\frac{L_{Pad}}{2} - OS_{bolts}\right) + \left(WT_{conc} + Soil_1\right)\cdot\frac{L_{Pad}}{2} + P_{Passive}\cdot\left(\frac{L_c + T_{Pad}}{3}\right) + Soil_2\cdot\left(L_{Pad} + \frac{D_s\cdot\tan(\phi)}{3}\right)$

$RM = 6.08\times 10^3\cdot kip\cdot ft$

$OMSafetyFactor_{Prov} := \frac{RM}{OTM}$ $OMSafetyFactor_{Prov} = 3.33$

$OTMCheck := if\left(OMSafetyFactor_{Prov} < SafetyFactor_{req}, \text{"No Good"}, \text{"Okay"}\right)$ OTMCheck = "Okay"

ROBINSON & COLE LLP

KENNETH C. BALDWIN

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

August 2, 2011

ORIGINAL

David Martin
Siting Analyst
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-047-101216 – Cellco Partnership d/b/a Verizon Wireless**
232 South Main Street, East Windsor, Connecticut

Dear Mr. Martin:

On January 18, 2011, the Siting Council acknowledged receipt of Cellco's notice of intent to modify the above-referenced telecommunications facility. This modification involved the replacement of six of Cellco's existing antennas, which in, turn, require the reinforcement of the tower.

Attached is an Existing Telecommunications Tower Modification Certification Letter vertifying that the tower reinforcement was completed in accordance with the modification plans and that the modified tower does not exceed 100% of its post-construction structural rating. Construction activity associated with these modifications has now been completed.

If you have any questions regarding any of these materials, please do not hesitate to contact me or Rachel Mayo.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Sandy M. Carter
Brian Ragozzine
Mark Gauger

CENTEK engineering

Centered on Solutions℠

August 1, 2011

Mr. Mark Gauger
Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

Re: Exiting Telecommunications Tower Modification Certification Letter

Project:	**Verizon ~ East Windsor** 232 South Main Street East Windsor, Connecticut
Engineer:	**URS Corporation** 500 Enterprise Drive Rocky Hill, CT 06067
Contractor:	**Brois Construction** 253 Main Avenue Norwalk, CT 06851

Centek Project No.: 10179.CO28

Dear Mr. Gauger,

We are providing this "Existing Telecommunications Tower Modification Certification Letter" with regard to the antenna upgrade by Verizon Wireless at the above referenced project.

The following are the basis for substantiating compliance with the design documents prepared by Centek Engineering:

- Review of the structural analysis prepared by URS dated 11/18/2010.
- Field observations by Centek personnel of antenna installation on 8/1/2011 confirming compliance with the above referenced documents.
- The installation does not exceed 100 percent of their post-construction structural rating with reinforcements.

The work under this Contract has been reviewed and found, to the Engineer's best knowledge, information and belief, to be completed in general compliance with the documents referenced above.

Sincerely,

Carlo F. Centore, PE
Principal ~Structural Engineer

CC: Rachel Mayo, Tim Parks,