ROBINSON & COLE LLP

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RM-VEC-003-048-146-049-060803

August 3, 2006

Via Hand Delivery

S. Derek Phelps
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swaps**
Westford- Janoski Road, Ashford, CT
Ellington- 101 Burbank Road, Ellington, CT
Vernon 2- 60 Industrial Park Road, Vernon, CT
North Thompsonville- Bright Meadow Road, Enfield, CT

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains a wireless telecommunications facility at each of the above referenced locations. In its continuing effort to improve the quality and reliability of its wireless service, Cellco intends to replace and upgrade its antennas at each of these existing facility locations.

Westford

The Council originally approved Cellco's Westford facility on September 19, 2000. Cellco now intends to modify this facility by replacing the twelve cellular antennas with six newer model cellular antennas and six PCS antennas at the same location on the tower. Attached behind Tab 1 are specifications for the existing and proposed replacement antennas as well as a structural report verifying that the Janoski Road tower can support the proposed modification.

Ellington

The Council originally approved Cellco's Ellington facility on November 2, 2000. On November 17, 2004, the Council approved Cellco's request to replace six of its cellular antennas with six PCS antennas. Cellco now intends to modify this facility further by replacing the six cellular antennas with six newer model cellular antennas at the same location on the tower. Attached behind Tab 2 are specifications

for the existing and proposed replacement antennas as well as a structural report verifying that the Burbank Road tower can support the proposed modification.

Vernon 2

The Council originally approved Cellco's Vernon 2 facility on November 30, 2000. On November 17, 2004, the Council approved Cellco's request to replace six of its cellular antennas with six PCS antennas. Cellco now intends to modify this facility further by replacing the six cellular antennas with six newer model cellular antennas at the same location on the tower. Attached behind Tab 3 are specifications for the existing and proposed replacement antennas as well as a structural report verifying that the Industrial Park Road tower can support the proposed modification.

North Thompsonville

The Council originally approved Cellco's North Thompsonville facility on July 15, 1999. On March 3, 2005, the Council approved Cellco's request to replace six of its cellular antennas with six PCS antennas. Cellco now intends to modify this facility further by replacing the six cellular antennas with six newer model cellular antennas at the same location on the tower. Attached behind Tab 4 are specifications for the existing and proposed replacement antennas as well as a structural report verifying that the Bright Meadow Road tower can support the proposed modification.

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 the chief elected official for each of the affected municipalities.

The planned modifications to each facility falls 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 structures. Cellco's replacement antennas will be located at the same heights and locations as the existing antennas.

2. The proposed modifications will not affect associated equipment areas and 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 proposed modifications will not result in changes to radio frequency (RF) power density levels at either facility. Therefore, no new Power Density Calculation Tables are provided.

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

Sincerely,

Kenneth C. Baldwin

Enclosures

cc: Richard H. Fletcher, Ashford First Selectman
Michael P. Stupinski, Ellington First Selectman
Dr. Ellen Marmer, Vernon Mayor
Patrick L. Tallarita, Enfield Mayor
Sandy M. Carter
Michelle Kababik

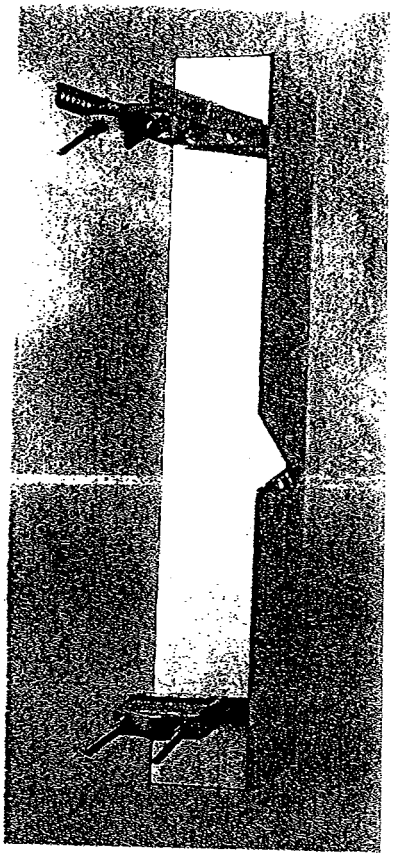
EXISTING

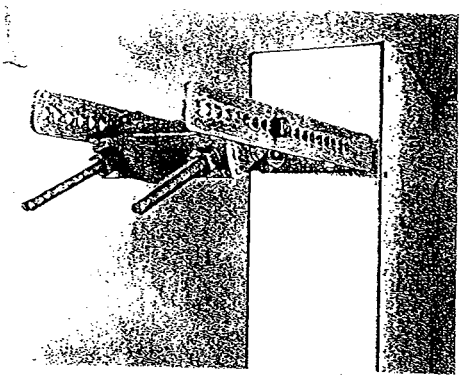
ALP-E 9011-Din

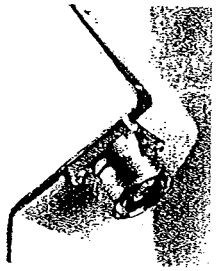
Enhanced Log-Periodic Antenna

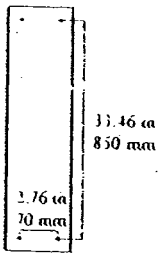
Features:

- ❑ Small Size
- ❑ Aesthetically Pleasing
- ❑ Suitable For TDMA/CDMA
- ❑ High Return Loss
- ❑ Low Intermodulation
- ❑ High FTB
- ❑ Broadbanded
- ❑ Side-lobe Suppression
- ❑ Sturdy Design
- ❑ Down-Tilt Brackets Incl.









The distance between the center of the bolts (on the back of the antenna) are shown in the drawing above.

Bolt diameter is: 3/8-16 (comes with lock nut).

Frequency Range:	800-900 MHz
Impedance:	50 ohm
Connector Type:	7/16 Din
Return Loss:	20 dB
Polarization:	Vertical
Gain:	> 11 dBd
Front To Back Ratio:	> 30 dB
Side-Lobe Suppression:	18 dB
Intermodulation (2x25W):	IM3 > 146 dB
	IM5 > 153 dB
	IM7/9 > 163 dB
Power Rating:	500 W
H-Plane (-3 dB point):	85 - 92°
V-Plane (-3 dB point):	16 - 18°
Lightning Protection:	DC Grounded

Overall Height:	43 in	[1092 mm]
Width:	6.5 in	[165 mm]
Depth:	8 in	[203 mm]
Weight Including Tilt-Brackets:	20 lbs	[9.1 Kg]
Rated Wind Velocity:	113 mph	[180 Km/h]
Wind Area (CxA/Side):	2.3 sq. ft.	[0.22 sq.m]
Lateral Thrust At Rated Wind Worst Case:	112 lbs	[500 N]

Radiating Elements:	Aluminum
Extrusion:	Aluminum
Radome:	Grey PVC
Tilt-Bracket:	Hot Dip Galvanized Steel
Antenna Bolts:	Stainless Steel

The ALP-E 9011-Din is made in U.S.A.

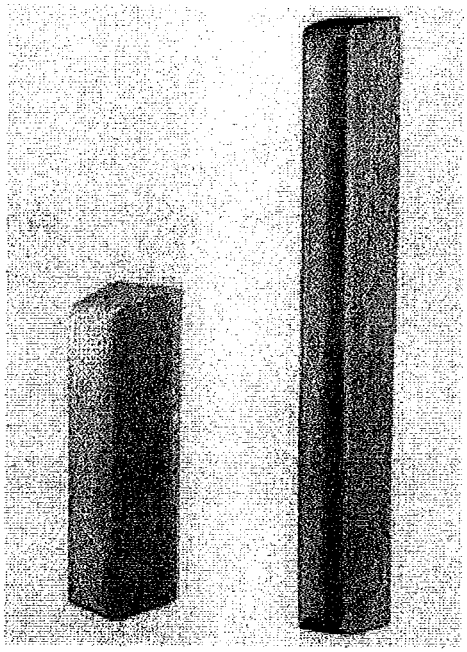
PROPOSED

Technical Data Sheet APL869012-42T0

Maximizer® Directional Panel Antenna

Product Description

The Celwave® Maximizer series is a log periodic dipole array which uses a patent pending design to achieve a front-to-back ratio of 45 dB, the highest front-to-back ratio in the industry. Maximizers are available to cover ESMR, AMPS, PCS and DCS frequency ranges. They use Celwave's patented monolithic CELlite® technology, which eliminates cable and soldered joints to reduce the possibility of inter-modulation products. The CELlite technology assures high reliability and excellent repeatability of electrical characteristics. The cellular Maximizers are available in 65°, 80° and 90° horizontal beamwidths and the PCS/DCS Maximizers are available in 65° and 90° horizontal beamwidths.



Features/Benefits

- **45 dB front-to-back ratio reduces co-channel interference.**
- **Monolithic construction reduces IM.**
- **No solder joints, high reliability.**
- **Surface treated components prevent galvanic corrosion.**
- **UV stabilized radome assures long life without radome deterioration due to UV exposure.**

Technical Features

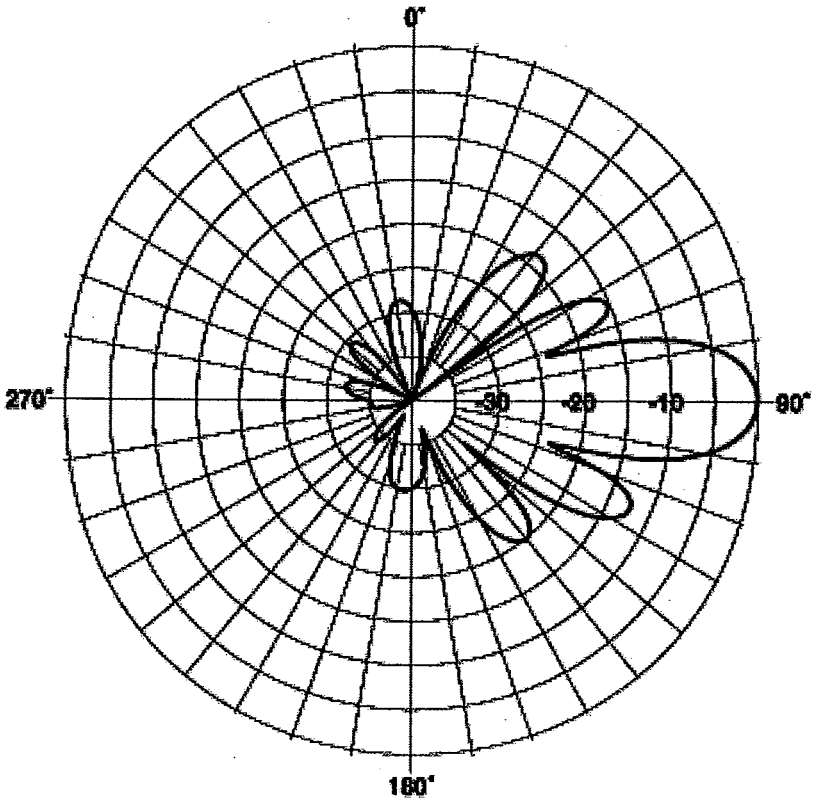
Frequency Band	Trunking/SMR (806-824, 851-869 MHz), Cellular (824-849, 869-894 MHz)
Horizontal Pattern	Directional
Antenna Type	Panel Log Periodic
Electrical Down Tilt Option	Fixed
Gain, dBi (dBd)	14.1 (12)
Frequency Range, MHz	806-894
Connector Type	7-16 DIN Female
Connector Location	Back

Maximizer® Directional Panel Antenna

Mount Type	Downtilt
Electrical Downtilt, deg	0
Horizontal Beamwidth, deg	90
Mounting Hardware	APM21-3
Rated Wind Speed, km/h (mph)	200 (125)
VSWR	< 1.5:1
Vertical Beamwidth, deg	15
Polarization	Vertical
Front-To-Back Ratio, dB	45
Maximum Power Input, W	500
Lightning protection	Direct Ground
3rd Order IMP @ 16 x 41 dBm, dBm	< -100
Overall Length, m (ft)	1.2 (4.0)
Dimensions - HxWxD, mm (in)	1219 x 152 x 203 (48 x 6 x 8)
Radiating Element Material	Aluminum Alloy
Radome Material	UV Stabilized High Impact ABS
Reflector Material	5052-H32 Aluminum
Max Wind Loading Area, m^2 (ft^2)	0.307 (3.3)
Survival Wind Speed, km/h (mph)	200 (125)
Maximum Thrust @ Rated Wind, N (lbf)	916 (206)
Side Wind Loading Area, m^2 (ft^2)	0.248 (2.67)
Side Thrust @ Rated Wind, N (lbf)	738 (166)
Shipping Weight, kg (lb)	7.9 (17.5)
Packing Dimensions, HxWxD, mm (in)	1270 x 305 x 203 (50 x 12 x 8)
Shipping Dimensions of Accessory - HxWxD, m (ft)	Packed w/antenna
Shipping Mode	UPS
Weight w/o Mtg Hardware, kg (lb)	3 (6.75)
Weight w/ Mtg Hardware, kg (lb)	4.2 (9.25)

Vertical Pattern

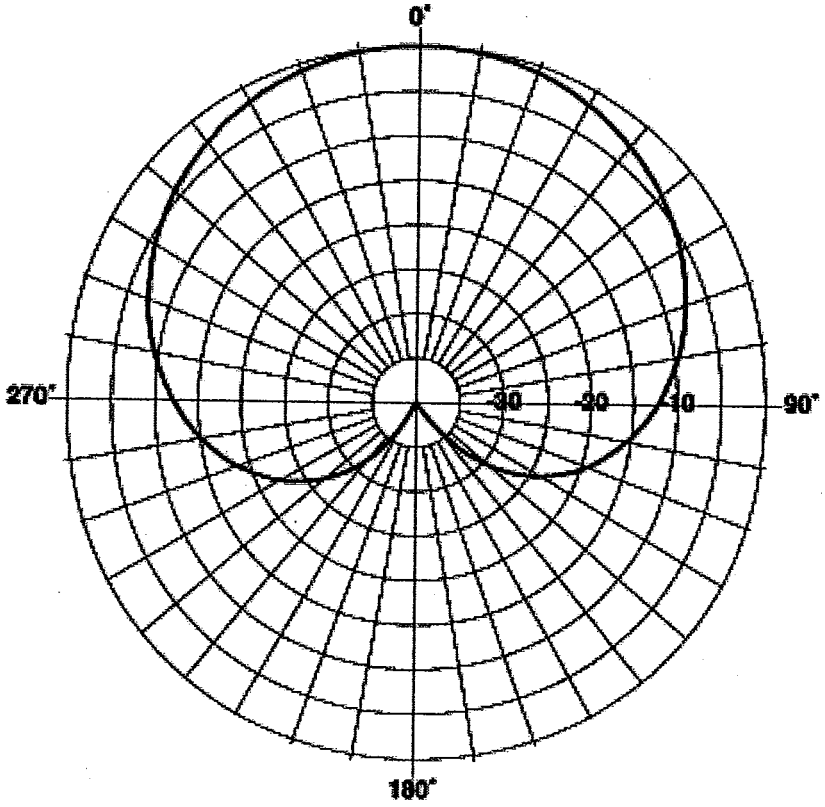
(This is a general representation of the antenna family pattern. For the latest detailed pattern contact Applications Engineering. You may also download the CELplot(TM) pattern reader and antenna pattern data fields from our website.)



Maximizer® Directional Panel Antenna

Horizontal Pattern

(This is a general representation of the antenna family pattern. For the latest detailed pattern contact Applications Engineering. You may also download the CELplot(TM) pattern reader and antenna pattern data fields from our website.)



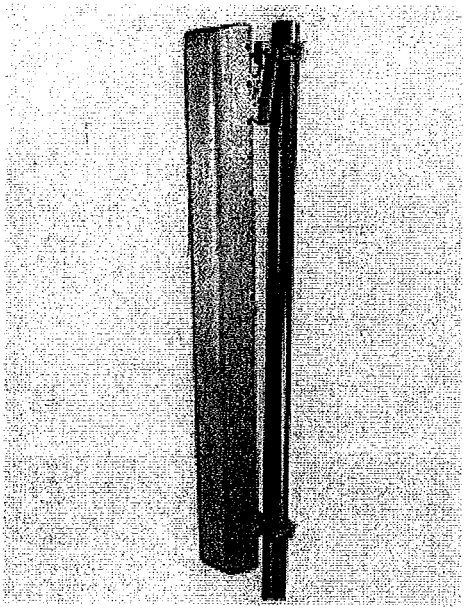
Proposed

Technical Data Sheet APL199016-42T2

Maximizer® Directional Panel Antenna

Product Description

The Celwave® Maximizer series is a log periodic dipole array which uses a patent pending design to achieve a front-to-back ratio of 45 dB, the highest front-to-back ratio in the industry. Maximizers are available to cover ESMR, AMPS, PCS and DCS frequency ranges. They use RFS's patented monolithic CELlite® technology, which eliminates cable and soldered joints to reduce the possibility of intermodulation products. The CELlite technology assures high reliability and excellent repeatability of electrical characteristics. The cellular Maximizers are available in 65°, 80° and 90° horizontal beamwidths and the PCS/DCS Maximizers are available in 65° and 90° horizontal beamwidths.



Features/Benefits

- **45 dB front-to-back ratio reduces co-channel interference.**
- **Monolithic construction reduces IM.**
- **No solder joints, high reliability.**
- **Surface treated components prevent galvanic corrosion.**
- **UV stabilized radome assures long life without radome deterioration due to UV exposure.**

Technical Features

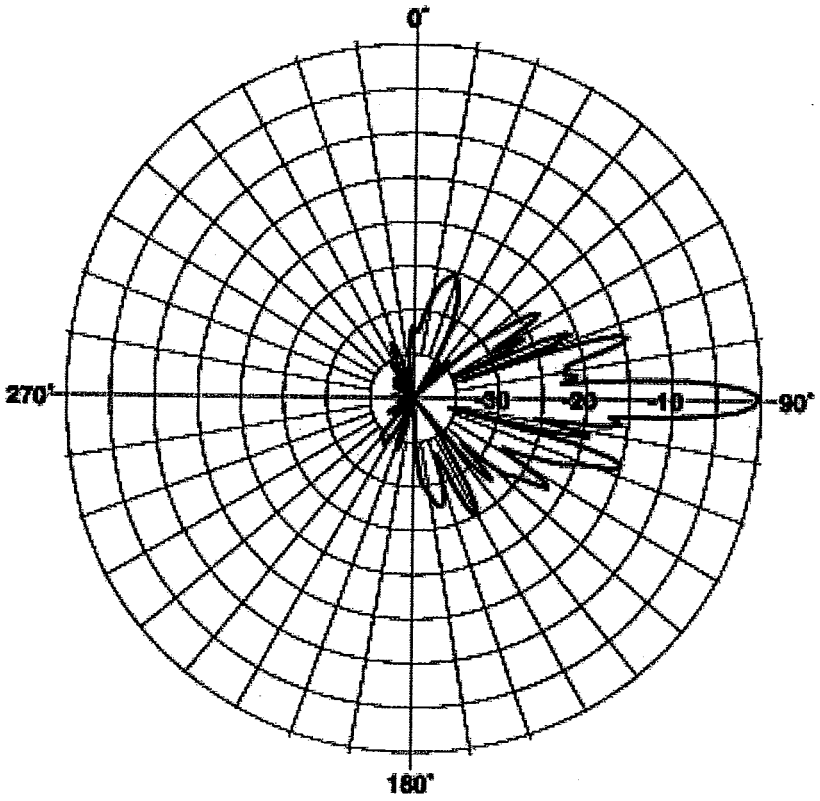
Frequency Band	PCS 1900 (1850-1990 MHz)
Horizontal Pattern	Directional
Antenna Type	Panel Log Periodic
Electrical Down Tilt Option	Fixed
Gain, dBi (dBd)	18.1 (16)
Frequency Range, MHz	1850-1990
Connector Type	7-16 DIN Female
Connector Location	Back
Mount Type	Downtilt
Electrical Downtilt, deg	2

Maximizer® Directional Panel Antenna

Horizontal Beamwidth, deg	90
Mounting Hardware	APM21-5
Rated Wind Speed, km/h (mph)	200 (125)
VSWR	< 1.5:1
Vertical Beamwidth, deg	4
1st Null Fill, dB	> -15
Null Fill, dB	> -15
1st Upper Sidelobe Suppression, dB	> 18
Upper Sidelobe Suppression, dB	> 18
Polarization	Vertical
Front-To-Back Ratio, dB	45
Maximum Power Input, W	500
Lightning protection	Direct Ground
3rd Order IMP @ 2 x 43 dBm, dBc	<-143
Overall Length, m (ft)	1.8 (6.0)
Dimensions - HxWxD, mm (in)	1829 x 127 x 102 (72 x 5 x 4)
Radiating Element Material	Aluminum Alloy
Radome Material	UV Stabilized High Impact ABS
Reflector Material	5052-H32 Aluminum
Max Wind Loading Area, m² (ft²)	0.234 (2.5)
Survival Wind Speed, km/h (mph)	200 (125)
Maximum Thrust @ Rated Wind, N (lbf)	445 (100)
Side Wind Loading Area, m² (ft²)	0.186 (2)
Side Thrust @ Rated Wind, N (lbf)	356 (80)
Shipping Weight, kg (lb)	9.5 (21)
Packing Dimensions, HxWxD, mm (in)	2083 x 356 x 254 (82 x 14 x 10)
Shipping Dimensions of Accessory - HxWxD, m (ft)	Packed w/antenna
Shipping Mode	UPS
Weight w/o Mtg Hardware, kg (lb)	4 (8)
Weight w/ Mtg Hardware, kg (lb)	4.5 (10)

Vertical Pattern

(This is a general representation of the antenna family pattern. For the latest detailed pattern contact Applications Engineering. You may also download the CELplot(TM) pattern reader and antenna pattern data fields from our website.)



Horizontal Pattern

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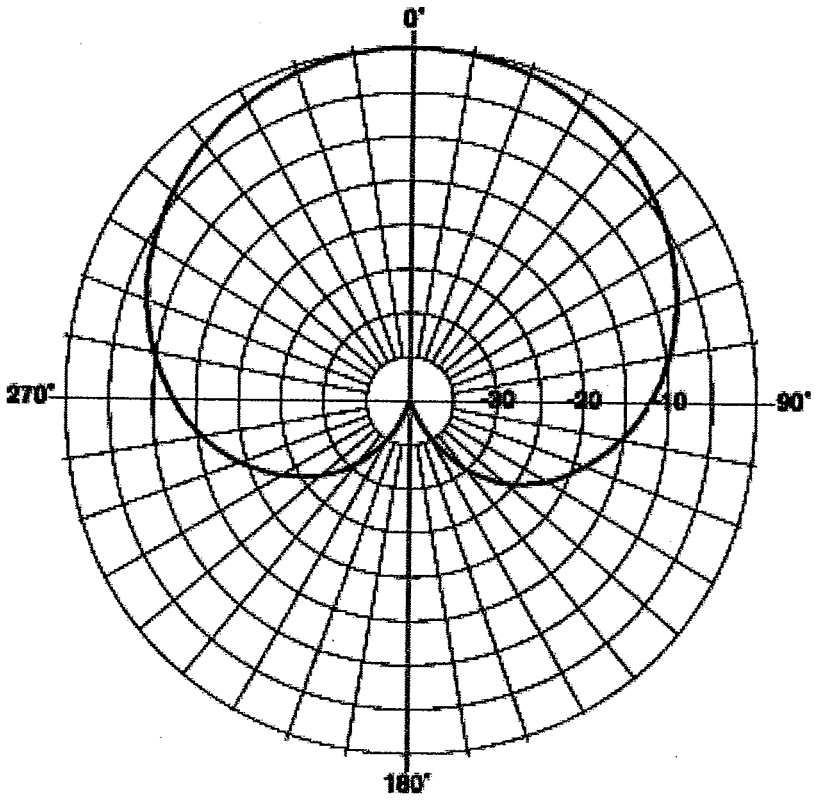


DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF 192' SELF-SUPPORTING LATTICE TOWER FOR NEW ANTENNA ARRANGEMENT

Janoski Road
Ashford, Connecticut

prepared for

verizonwireless

Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

URS

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

36931025.00008
VZ1-200

August 1, 2006

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 192' self supporting lattice tower located at Janoski Road in Ashford, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code and the TIA/EIA-222-F standard for wind velocity of 80 mph (fastest mile) and 69 mph (fastest mile) concurrent with ½" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report. The proposed Verizon modification is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove: **(12) existing Swedcom ALP-E-9011 antennas** **Install:** **(6) Celwave APL869012-42T0 antennas and (6) Celwave APL199016-42T2 antennas on (3) existing T-Frames with (12) existing 1 5/8" coax cables**	**Verizon (Proposed)**	**@ 180'**

The results of the analysis indicate that the tower structure, anchor bolts, and foundation are in compliance with the proposed loading conditions. **The tower is considered structurally adequate with the wind load classification specified above and all the existing and proposed antenna loading.**

This analysis is based on:

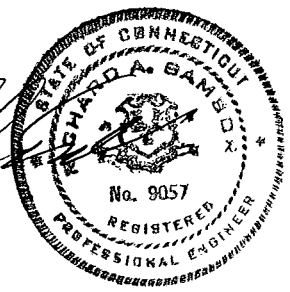
1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Tower geometry and structural member sizes taken from a tower report prepared by Rohn Industries, Inc, engineering file number 34589PH, signed and sealed December 17, 1996.
3) Antenna and mount configuration as specified on the following page of this report.

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

If you should have any questions, please call.

Sincerely,

URS Corporation



Richard A. Sambor, P.E.
Manager Facilities Design

RAS/jek

cc: AA, DR, IA, CF/Book – URS

2. INTRODUCTION

The subject tower is located at Janoski Road in Ashford, Connecticut. The structure is a 192' self-supporting lattice tower designed and manufactured Rohn Industries, Inc.

The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(6) DB980H90T2E-M antennas	Sprint (existing)	(3) T-Frames	192'	(6) 1 5/8" coax cables
(6) Celwave APL869012-42T0 antennas (6) Celwave APL199016-42T2 antennas	**Verizon (proposed)**	**(3) T-Frames**	**180'**	**(12) 1 5/8" coax cables**
(9) ALP 9212-N antennas	Nextel (existing)	(3) T-Frames	170'	(9)1 5/8" coax cables
(3) Allgon 7250.03 antennas	Cingular Blue (existing)	Mounted to legs	160'	(6) dead 1 5/8" coax cables
(6) DAPA 79210 antennas	T-Mobile (existing)	(3) Sidearms	150'	(6) 1/2" coax cables
(9) CSS DUO1417-8686 antennas (9) ADC MHAs	Cingular (existing)	(3) T-Frames	140'	(12) 1 5/8" coax cables
(1) Catrain 738449 antenna	Cingular (existing)	Sidearm	110'	(1) 1/2" coax cable

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 existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with the 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 analysis was conducted using RISA Tower 4.5. 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 (without ice) + Tower Dead Load
Load Condition 2 = 69 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

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

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

4. FINDINGS AND EVALUATION

Stresses on the tower structure were evaluated to compare with allowable stresses in accordance with AISC. The calculated stresses under the proposed loading were within the allowable stresses. Detailed analysis and calculations for the proposed load condition are provided in section 6 of this report. The anchor bolts and foundation were also found to be within the allowable limits.

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis indicate that the tower structure, anchor bolts, and foundation are in compliance with the proposed loading conditions. **The tower is structurally adequate under the wind load classification specified above and the proposed antenna loadings.**

Limitations/Assumptions:

This report is based on the following:

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

URS is not responsible for any 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.

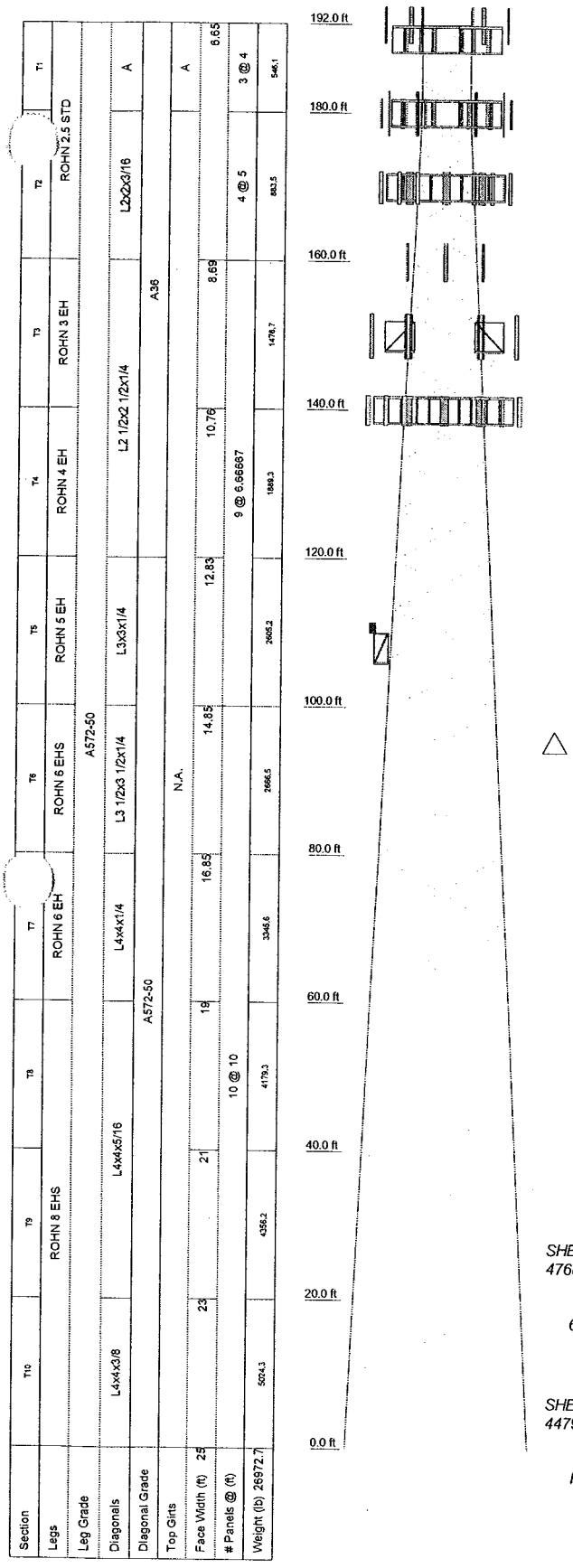
Ongoing and Periodic Inspection and Maintenance:

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

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

6. DRAWINGS AND DATA

RISA TOWER INPUT/OUTPUT SUMMARY



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB980H90T2E-M (Sprint)	192	T-Frame (Nextel)	170
(2) DB980H90T2E-M (Sprint)	192	T-Frame (Nextel)	170
(2) DB980H90T2E-M (Sprint)	192	T-Frame (Nextel)	170
T-Frame (Sprint)	190	7250.03 w/Mount Pipe (Cingular Blue)	160
T-Frame (Sprint)	190	7250.03 w/Mount Pipe (Cingular Blue)	160
T-Frame (Sprint)	190	7250.03 w/Mount Pipe (Cingular Blue)	160
APL869012-42T0 (Verizon)	180	(2) 79210 (T-Mobile)	150
APL199016-42T2 (Verizon)	180	(2) 79210 (T-Mobile)	150
APL869012-42T0 (Verizon)	180	(2) 79210 (T-Mobile)	150
APL199016-42T2 (Verizon)	180	3' Sidearm (T-Mobile)	150
APL869012-42T0 (Verizon)	180	3' Sidearm (T-Mobile)	150
APL199016-42T2 (Verizon)	180	3' Sidearm (T-Mobile)	150
APL869012-42T0 (Verizon)	180	(3) DUO1417-8686 (Cingular)	140
APL199016-42T2 (Verizon)	180	(3) DUO1417-8686 (Cingular)	140
APL869012-42T0 (Verizon)	180	(3) DUO1417-8686 (Cingular)	140
APL199016-42T2 (Verizon)	180	(3) MHA (Cingular)	140
APL869012-42T0 (Verizon)	180	(3) MHA (Cingular)	140
APL199016-42T2 (Verizon)	180	(3) MHA (Cingular)	140
T-Frame (Verizon)	180	T-Frame (Cingular)	140
T-Frame (Verizon)	180	T-Frame (Cingular)	140
T-Frame (Verizon)	180	T-Frame (Cingular)	140
(3) ALP 9212-N (Nextel)	170	Catrain 738449 (Cingular)	110
(3) ALP 9212-N (Nextel)	170	3' Sidearm (Cingular)	108
(3) ALP 9212-N (Nextel)	170		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L1 3/4x1 3/4x3/16		

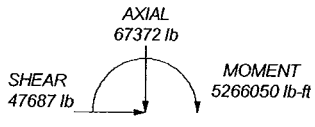
MATERIAL STRENGTH

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

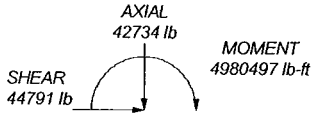
TOWER DESIGN NOTES

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 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 78.5%

MAX PIER FORCES:
DOWN: 265685 lb
UPLIFT: -208998 lb
SHEAR: 28562 lb



TORQUE 32660 lb-ft
69 mph WIND - 0.5000 in ICE



TORQUE 32188 lb-ft
REACTIONS - 80 mph WIND

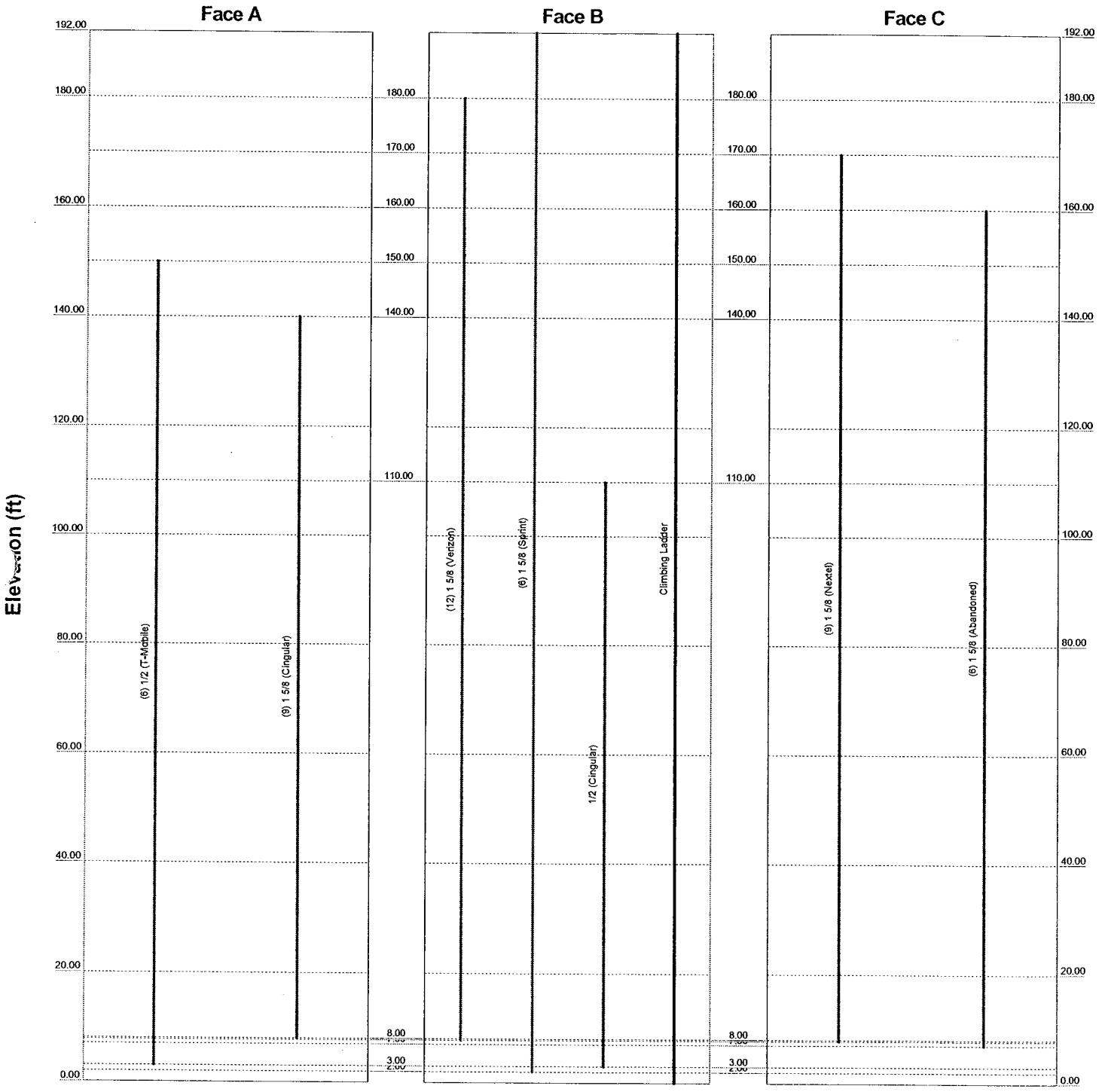
URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: (850) 529-8882
FAX: (860) 529-3991

Job: *192' Self-Supporting Lattice Tower*			
Project: *Janoski Road Ashford, CT*			
Client: Verizon Wireless	Drawn by: Staff	App'd:	
Code: TIA/EIA-222-F	Date: 08/01/06	Scale: NTS	
Path: P:\08\ERI Files\192' Self-Supporting Lattice Tower.er		Dwg No. E-1	

RISA TOWER FEEDLINE DISTRIBUTION

Feedline Distribution Chart
0' - 192'

Round Flat App In Face App Out Face Truss Leg



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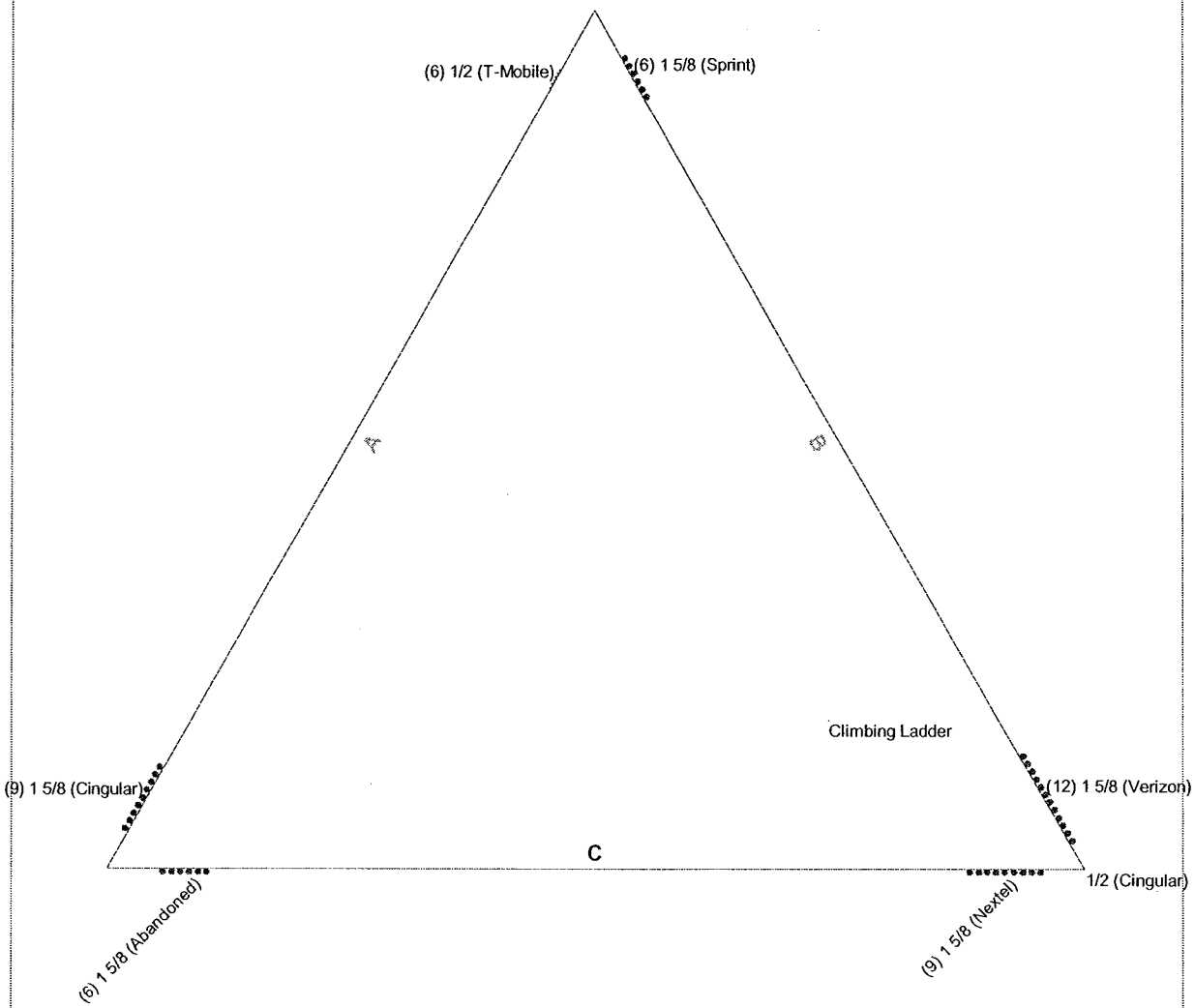
Path: P:\08\ERI Files\192' Self-Supporting Lattice Tower.er		Dwg No. E-7	

RISA TOWER FEEDLINE PLAN

Feedline Plan
20'

..... Round _____ Flat ..... App In Face App Out Face

Section @ 20'



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Job: *192' Self-Supporting Lattice Tower*			
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Code: TIA/EIA-222-F	Date: 08/01/06	Scale: NTS	
Path: P:\OB\ERI Files\192' Self-Supporting Lattice Tower.er		Dwg No. E-7	

RISA TOWER DETAILED OUTPUT

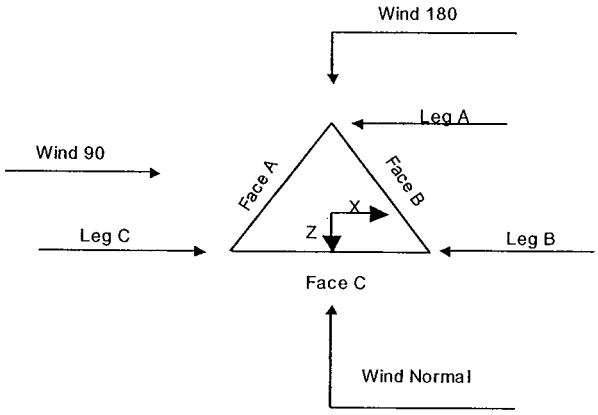
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 192.00 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 6.65 ft at the top and 25.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 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 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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	192.00-180.00			6.65	1	12.00
T2	180.00-160.00			6.65	1	20.00
T3	160.00-140.00			8.69	1	20.00
T4	140.00-120.00			10.76	1	20.00
T5	120.00-100.00			12.83	1	20.00
T6	100.00-80.00			14.85	1	20.00
T7	80.00-60.00			16.85	1	20.00
T8	60.00-40.00			19.00	1	20.00
T9	40.00-20.00			21.00	1	20.00
T10	20.00-0.00			23.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	192.00-180.00	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 192.00-180.00	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	L2x2x3/16	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	L2 1/2x2 1/2x1/4	A36 (36 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	L4x4x1/4	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 EHS	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T10 20.00-0.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Single Angle	L4x4x3/8	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 192.00-180.00	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Solid Round		A36 (36 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

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 192.00-180.00	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 (36 ksi)	1	1	1	36.0000	36.0000
T8 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 20.00-0.00	0.00	0.0000	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	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 192.00-180.00	Yes	Yes	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
T3 160.00-140.00	Yes	Yes	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
T5 120.00-100.00	Yes	Yes	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
T7 80.00-60.00	Yes	Yes	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
T9 40.00-20.00	Yes	Yes	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] *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		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 192.00-180.00	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
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 192.00-180.00	Flange	0.6250 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
T2 180.00-160.00	Flange	0.6250 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
T3 160.00-140.00	Flange	0.8750 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
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	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
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 A325X	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
1 5/8 (Nextel)	C	Yes	Ar (CfAe)	170.00 - 7.75	0.0000	-0.42	9	9	0.5000 1.9800	1.9800		1.04
1 5/8 (Abandoned)	C	Yes	Ar (CfAe)	160.00 - 7.00	0.0000	0.42	6	6	0.5000 1.9800	1.9800		1.04
1 5/8 (Verizon)	B	Yes	Ar (CfAe)	180.00 - 7.75	0.0000	0.42	12	12	0.5000 1.9800	1.9800		1.04
1 5/8 (Sprint)	B	Yes	Ar (CfAe)	192.00 - 2.00	0.0000	-0.42	6	6	0.5000 1.9800	1.9800		1.04
1/2 (T-Mobile)	A	Yes	Ar (CfAe)	150.00 - 3.00	0.0000	0.42	6	6	0.5800	0.5800		0.25
1 5/8 (Cingular)	A	Yes	Ar (CfAe)	140.00 - 8.00	0.0000	-0.42	9	9	0.5000 1.9800	1.9800		1.04
1/2 (Cingular)	B	No	Ar (Leg)	110.00 - 3.00	0.0000	0	1	1	0.5800	0.5800		0.25
Climbing Ladder	B	No	Af (Leg)	192.00 - 0.00	0.0000	0.3	1	1	0.2500	0.0000	0.0000	7.90

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 lb
T1	192.00-180.00	A	0.000	0.000	0.000	0.000	0.00
		B	11.880	0.000	0.000	0.000	169.68
		C	0.000	0.000	0.000	0.000	0.00
T2	180.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	59.400	0.000	0.000	0.000	532.40
		C	14.850	0.000	0.000	0.000	93.60
T3	160.00-140.00	A	2.900	0.000	0.000	0.000	15.00
		B	59.400	0.000	0.000	0.000	532.40
		C	49.500	0.000	0.000	0.000	312.00
T4	140.00-120.00	A	35.500	0.000	0.000	0.000	217.20
		B	59.400	0.000	0.000	0.000	532.40
		C	49.500	0.000	0.000	0.000	312.00
T5	120.00-100.00	A	35.500	0.000	0.000	0.000	217.20
		B	59.883	0.000	0.000	0.000	534.90
		C	49.983	0.000	0.000	0.000	312.00
T6	100.00-80.00	A	35.500	0.000	0.000	0.000	217.20
		B	60.367	0.000	0.000	0.000	537.40
		C	50.467	0.000	0.000	0.000	312.00
T7	80.00-60.00	A	35.500	0.000	0.000	0.000	217.20
		B	60.367	0.000	0.000	0.000	537.40
		C	50.467	0.000	0.000	0.000	312.00
T8	60.00-40.00	A	35.500	0.000	0.000	0.000	217.20
		B	60.367	0.000	0.000	0.000	537.40
		C	50.467	0.000	0.000	0.000	312.00
T9	40.00-20.00	A	35.500	0.000	0.000	0.000	217.20
		B	60.367	0.000	0.000	0.000	537.40
		C	50.467	0.000	0.000	0.000	312.00
T10	20.00-0.00	A	22.750	0.000	0.000	0.000	137.82
		B	42.897	0.000	0.000	0.000	427.45
		C	31.883	0.000	0.000	0.000	195.78

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 lb
T1	192.00-180.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		2.980	13.067	0.000	0.000	292.87
		C		0.000	0.667	0.000	0.000	0.00
T2	180.00-160.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		9.933	67.244	0.000	0.000	1136.88
		C		2.483	17.644	0.000	0.000	242.88
T3	160.00-140.00	A	0.500	1.317	4.833	0.000	0.000	52.10
		B		9.933	67.244	0.000	0.000	1136.88
		C		9.933	54.844	0.000	0.000	808.52
T4	140.00-120.00	A	0.500	7.600	42.733	0.000	0.000	589.95
		B		9.933	67.244	0.000	0.000	1136.88
		C		9.933	54.844	0.000	0.000	808.52
T5	120.00-100.00	A	0.500	7.600	42.733	0.000	0.000	589.95
		B		11.250	67.244	0.000	0.000	1145.98
		C		11.250	54.844	0.000	0.000	808.52
T6	100.00-80.00	A	0.500	7.600	42.733	0.000	0.000	589.95
		B		12.567	67.244	0.000	0.000	1155.07
		C		12.567	54.844	0.000	0.000	808.52
T7	80.00-60.00	A	0.500	7.600	42.733	0.000	0.000	589.95
		B		12.567	67.244	0.000	0.000	1155.07
		C		12.567	54.844	0.000	0.000	808.52
T8	60.00-40.00	A	0.500	7.600	42.733	0.000	0.000	589.95
		B		12.567	67.244	0.000	0.000	1155.07
		C		12.567	54.844	0.000	0.000	808.52
T9	40.00-20.00	A	0.500	7.600	42.733	0.000	0.000	589.95
		B		12.567	67.244	0.000	0.000	1155.07
		C		12.567	54.844	0.000	0.000	808.52
T10	20.00-0.00	A	0.500	5.218	28.057	0.000	0.000	380.02
		B		9.750	47.559	0.000	0.000	868.67
		C		8.509	34.798	0.000	0.000	507.32

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	192.00-180.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	1.155	2.065
		C	0.000	0.000	0.000	0.000
T2	180.00-160.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	4.737	8.089
		C	0.000	0.000	1.184	2.022
T3	160.00-140.00	A	0.000	0.000	0.220	0.591
		B	0.000	0.000	4.507	7.311
		C	0.000	0.000	3.756	6.119
T4	140.00-120.00	A	0.000	0.000	2.550	4.581
		B	0.000	0.000	4.268	6.922
		C	0.000	0.000	3.556	5.794
T5	120.00-100.00	A	0.000	0.000	2.956	5.123
		B	0.000	0.000	4.947	7.743
		C	0.000	0.000	4.122	6.480
T6	100.00-80.00	A	0.000	0.000	2.449	4.134
		B	0.000	0.000	4.098	6.248
		C	0.000	0.000	3.415	5.229

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T7	80.00-60.00	A	0.000	0.000	2.711	4.484
		B	0.000	0.000	4.536	6.776
		C	0.000	0.000	3.780	5.672
T8	60.00-40.00	A	0.000	0.000	2.646	4.378
		B	0.000	0.000	4.428	6.616
		C	0.000	0.000	3.690	5.537
T9	40.00-20.00	A	0.000	0.000	2.600	4.301
		B	0.000	0.000	4.350	6.500
		C	0.000	0.000	3.625	5.440
T10	20.00-0.00	A	0.000	0.000	1.643	2.804
		B	0.000	0.000	3.039	4.547
		C	0.000	0.000	2.243	3.367

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	192.00-180.00	0.8614	-8.7299	0.7930	-6.0495
T2	180.00-160.00	16.7399	1.9416	14.0558	2.2028
T3	160.00-140.00	13.9611	6.8575	12.3070	5.7166
T4	140.00-120.00	5.4312	9.5005	5.1978	7.6528
T5	120.00-100.00	5.7635	9.9147	5.7955	8.2280
T6	100.00-80.00	6.5984	11.1830	6.9051	9.5354
T7	80.00-60.00	6.9976	11.8720	7.3924	10.2087
T8	60.00-40.00	7.1261	12.1035	7.6374	10.5596
T9	40.00-20.00	7.6612	13.0238	8.2212	11.3773
T10	20.00-0.00	5.8929	6.4016	6.5884	5.6306

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	lb
(2) DB980H90T2E-M (Sprint)	A	From Leg	3.00 0.00 0.00	0.0000	192.00	No Ice 1/2" Ice	3.80 4.18	2.19 2.56	8.50 28.62
(2) DB980H90T2E-M (Sprint)	B	From Leg	3.00 0.00 0.00	0.0000	192.00	No Ice 1/2" Ice	3.80 4.18	2.19 2.56	8.50 28.62
(2) DB980H90T2E-M (Sprint)	C	From Leg	3.00 0.00 0.00	0.0000	192.00	No Ice 1/2" Ice	3.80 4.18	2.19 2.56	8.50 28.62
T-Frame (Sprint)	A	From Leg	1.50 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00
T-Frame (Sprint)	B	From Leg	1.50 0.00	0.0000	190.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00

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 (lb)
			0.00						
T-Frame	C	From Leg	1.50	0.0000	190.00	No Ice	13.60	13.60	465.00
(Sprint)			0.00			1/2" Ice	18.40	18.40	600.00
			0.00						
APL869012-42T0	A	From Leg	3.00	0.0000	180.00	No Ice	2.87	3.73	6.32
(Verizon)			6.00			1/2" Ice	3.18	4.10	31.70
			0.00						
APL199016-42T2	A	From Leg	3.00	0.0000	180.00	No Ice	4.12	3.53	8.00
(Verizon)			4.00			1/2" Ice	4.56	3.97	32.31
			0.00						
APL869012-42T0	A	From Leg	3.00	0.0000	180.00	No Ice	2.87	3.73	6.32
(Verizon)			-6.00			1/2" Ice	3.18	4.10	31.70
			0.00						
APL199016-42T2	A	From Leg	3.00	0.0000	180.00	No Ice	4.12	3.53	8.00
(Verizon)			-4.00			1/2" Ice	4.56	3.97	32.31
			0.00						
APL869012-42T0	B	From Leg	3.00	0.0000	180.00	No Ice	2.87	3.73	6.32
(Verizon)			6.00			1/2" Ice	3.18	4.10	31.70
			0.00						
APL199016-42T2	B	From Leg	3.00	0.0000	180.00	No Ice	4.12	3.53	8.00
(Verizon)			4.00			1/2" Ice	4.56	3.97	32.31
			0.00						
APL869012-42T0	B	From Leg	3.00	0.0000	180.00	No Ice	2.87	3.73	6.32
(Verizon)			-6.00			1/2" Ice	3.18	4.10	31.70
			0.00						
APL199016-42T2	B	From Leg	3.00	0.0000	180.00	No Ice	4.12	3.53	8.00
(Verizon)			-4.00			1/2" Ice	4.56	3.97	32.31
			0.00						
APL869012-42T0	C	From Leg	3.00	0.0000	180.00	No Ice	2.87	3.73	6.32
(Verizon)			6.00			1/2" Ice	3.18	4.10	31.70
			0.00						
APL199016-42T2	C	From Leg	3.00	0.0000	180.00	No Ice	4.12	3.53	8.00
(Verizon)			4.00			1/2" Ice	4.56	3.97	32.31
			0.00						
APL869012-42T0	C	From Leg	3.00	0.0000	180.00	No Ice	2.87	3.73	6.32
(Verizon)			-6.00			1/2" Ice	3.18	4.10	31.70
			0.00						
APL199016-42T2	C	From Leg	3.00	0.0000	180.00	No Ice	4.12	3.53	8.00
(Verizon)			-4.00			1/2" Ice	4.56	3.97	32.31
			0.00						
T-Frame	A	From Leg	1.50	0.0000	180.00	No Ice	13.60	13.60	465.00
(Verizon)			0.00			1/2" Ice	18.40	18.40	600.00
			0.00						
T-Frame	B	From Leg	1.50	0.0000	180.00	No Ice	13.60	13.60	465.00
(Verizon)			0.00			1/2" Ice	18.40	18.40	600.00
			0.00						
T-Frame	C	From Leg	1.50	0.0000	180.00	No Ice	13.60	13.60	465.00
(Verizon)			0.00			1/2" Ice	18.40	18.40	600.00
			0.00						
(3) ALP 9212-N	A	From Leg	3.00	0.0000	170.00	No Ice	5.78	5.78	17.16
(Nextel)			0.00			1/2" Ice	6.20	6.20	62.42
			0.00						
(3) ALP 9212-N	B	From Leg	3.00	0.0000	170.00	No Ice	5.78	5.78	17.16
(Nextel)			0.00			1/2" Ice	6.20	6.20	62.42
			0.00						
(3) ALP 9212-N	C	From Leg	3.00	0.0000	170.00	No Ice	5.78	5.78	17.16
(Nextel)			0.00			1/2" Ice	6.20	6.20	62.42

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 lb
			0.00						
T-Frame	A	From Leg	1.50	0.0000	170.00	No Ice	13.60	13.60	465.00
(Nextel)			0.00			1/2" Ice	18.40	18.40	600.00
			0.00						
T-Frame	B	From Leg	1.50	0.0000	170.00	No Ice	13.60	13.60	465.00
(Nextel)			0.00			1/2" Ice	18.40	18.40	600.00
			0.00						
T-Frame	C	From Leg	1.50	0.0000	170.00	No Ice	13.60	13.60	465.00
(Nextel)			0.00			1/2" Ice	18.40	18.40	600.00
			0.00						
7250.03 w/Mount Pipe	A	From Leg	1.00	0.0000	160.00	No Ice	4.45	3.54	40.95
(Cingular Blue)			0.00			1/2" Ice	5.03	4.72	76.25
			0.00						
7250.03 w/Mount Pipe	B	From Leg	1.00	0.0000	160.00	No Ice	4.45	3.54	40.95
(Cingular Blue)			0.00			1/2" Ice	5.03	4.72	76.25
			0.00						
7250.03 w/Mount Pipe	C	From Leg	1.00	0.0000	160.00	No Ice	4.45	3.54	40.95
(Cingular Blue)			0.00			1/2" Ice	5.03	4.72	76.25
			0.00						
(2) 79210	A	From Leg	3.00	0.0000	150.00	No Ice	8.32	2.77	27.60
(T-Mobile)			0.00			1/2" Ice	8.86	3.22	65.71
			0.00						
(2) 79210	B	From Leg	3.00	0.0000	150.00	No Ice	8.32	2.77	27.60
(T-Mobile)			0.00			1/2" Ice	8.86	3.22	65.71
			0.00						
(2) 79210	C	From Leg	3.00	0.0000	150.00	No Ice	8.32	2.77	27.60
(T-Mobile)			0.00			1/2" Ice	8.86	3.22	65.71
			0.00						
3' Sidearm	A	From Leg	1.50	0.0000	150.00	No Ice	5.90	5.90	130.00
(T-Mobile)			0.00			1/2" Ice	6.60	6.60	145.60
			0.00						
3' Sidearm	B	From Leg	1.50	0.0000	150.00	No Ice	5.90	5.90	130.00
(T-Mobile)			0.00			1/2" Ice	6.60	6.60	145.60
			0.00						
3' Sidearm	C	From Leg	1.50	0.0000	150.00	No Ice	5.90	5.90	130.00
(T-Mobile)			0.00			1/2" Ice	6.60	6.60	145.60
			0.00						
(3) DUO1417-8686	A	From Leg	3.00	0.0000	140.00	No Ice	6.53	4.20	20.30
(Cingular)			0.00			1/2" Ice	6.94	4.57	62.49
			0.00						
(3) DUO1417-8686	B	From Leg	3.00	0.0000	140.00	No Ice	6.53	4.20	20.30
(Cingular)			0.00			1/2" Ice	6.94	4.57	62.49
			0.00						
(3) DUO1417-8686	C	From Leg	3.00	0.0000	140.00	No Ice	6.53	4.20	20.30
(Cingular)			0.00			1/2" Ice	6.94	4.57	62.49
			0.00						
(3) MHA	A	From Leg	3.00	0.0000	140.00	No Ice	0.95	0.29	10.00
(Cingular)			0.00			1/2" Ice	1.08	0.39	20.00
			0.00						
(3) MHA	B	From Leg	3.00	0.0000	140.00	No Ice	0.95	0.29	10.00
(Cingular)			0.00			1/2" Ice	1.08	0.39	20.00
			0.00						
(3) MHA	C	From Leg	3.00	0.0000	140.00	No Ice	0.95	0.29	10.00
(Cingular)			0.00			1/2" Ice	1.08	0.39	20.00
			0.00						
T-Frame	A	From Leg	1.50	0.0000	140.00	No Ice	13.60	13.60	465.00
(Cingular)			0.00			1/2" Ice	18.40	18.40	600.00

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 lb
			0.00						
T-Frame	B	From Leg	1.50	0.0000	140.00	No Ice	13.60	13.60	465.00
(Cingular)			0.00			1/2" Ice	18.40	18.40	600.00
			0.00						
T-Frame	C	From Leg	1.50	0.0000	140.00	No Ice	13.60	13.60	465.00
(Cingular)			0.00			1/2" Ice	18.40	18.40	600.00
			0.00						
Catrain 738449	C	From Leg	3.00	0.0000	110.00	No Ice	0.44	0.44	0.00
(Cingular)			0.00			1/2" Ice	0.62	0.62	0.00
			0.00						
3' Sidearm	C	From Leg	1.50	0.0000	108.00	No Ice	5.90	5.90	130.00
(Cingular)			0.00			1/2" Ice	6.60	6.60	145.60
			0.00						

Tower Pressures - No Ice

$G_H = 1.117$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 192.00-180.00	186.00	1.639	27	82.675	A	7.480	5.750	5.750	43.46	0.000	0.000
					B	6.325	17.630		24.00		
					C	7.480	5.750		43.46		
T2 180.00-160.00	170.00	1.597	26	158.198	A	11.834	9.600	9.600	44.79	0.000	0.000
					B	7.097	69.000		12.62		
					C	10.650	24.450		27.35		
T3 160.00-140.00	150.00	1.541	25	200.341	A	14.097	14.587	11.687	40.75	0.000	0.000
					B	9.809	71.087		14.45		
					C	10.561	61.187		16.29		
T4 140.00-120.00	130.00	1.48	24	243.410	A	13.872	50.527	15.027	23.33	0.000	0.000
					B	12.155	74.427		17.36		
					C	12.866	64.527		19.42		
T5 120.00-100.00	110.00	1.411	23	286.083	A	19.344	54.075	18.575	25.30	0.000	0.000
					B	17.353	78.458		19.39		
					C	18.178	68.558		21.42		
T6 100.00-80.00	90.00	1.332	22	328.055	A	18.689	57.620	22.120	28.99	0.000	0.000
					B	17.040	82.487		22.23		
					C	17.723	72.587		24.49		
T7 80.00-60.00	70.00	1.24	20	369.558	A	23.819	57.626	22.126	27.17	0.000	0.000
					B	21.994	82.492		21.18		
					C	22.750	72.592		23.21		
T8 60.00-40.00	50.00	1.126	18	414.393	A	26.163	64.298	28.798	31.83	0.000	0.000
					B	24.381	89.165		25.36		
					C	25.119	79.265		27.59		
T9 40.00-20.00	30.00	1	16	454.393	A	28.572	64.298	28.798	31.01	0.000	0.000
					B	26.822	89.165		24.83		
					C	27.547	79.265		26.96		
T10 20.00-0.00	10.00	1	16	494.393	A	31.988	51.548	28.798	34.47	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
					B	30.592	71.695		28.15		
					C	31.388	60.681		31.28		

Tower Pressure - With Ice

$G_H = 1.117$

Section Elevation	z	K_Z	q_z	t_Z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1 192.00-180.00	186.00	1.639	20	0.5000	83.675	A	10.330	7.750	7.750	42.86	0.000	0.000
						B	21.332	10.730		24.17		
						C	10.997	7.750		41.34		
T2 180.00-160.00	170.00	1.597	20	0.5000	159.867	A	15.779	12.939	12.939	45.06	0.000	0.000
						B	74.934	22.872		13.23		
						C	31.401	15.422		27.63		
T3 160.00-140.00	150.00	1.541	19	0.5000	202.010	A	22.377	16.343	15.027	38.81	0.000	0.000
						B	78.068	24.960		14.59		
						C	66.860	24.960		16.37		
T4 140.00-120.00	130.00	1.48	18	0.5000	245.079	A	58.955	25.966	18.366	21.63	0.000	0.000
						B	81.124	28.299		16.78		
						C	69.853	28.299		18.71		
T5 120.00-100.00	110.00	1.411	17	0.5000	287.752	A	64.866	29.514	21.914	23.22	0.000	0.000
						B	86.758	33.164		18.27		
						C	75.620	33.164		20.14		
T6 100.00-80.00	90.00	1.332	16	0.5000	329.724	A	63.764	33.059	25.459	26.29	0.000	0.000
						B	86.161	38.026		20.50		
						C	74.779	38.026		22.57		
T7 80.00-60.00	70.00	1.24	15	0.5000	371.227	A	69.201	33.066	25.466	24.90	0.000	0.000
						B	91.420	38.032		19.67		
						C	80.124	38.032		21.55		
T8 60.00-40.00	50.00	1.126	14	0.5000	416.062	A	71.966	39.737	32.137	28.77	0.000	0.000
						B	94.239	44.703		23.13		
						C	82.918	44.703		25.18		
T9 40.00-20.00	30.00	1	12	0.5000	456.062	A	74.800	39.737	32.137	28.06	0.000	0.000
						B	97.112	44.703		22.66		
						C	85.772	44.703		24.63		
T10 20.00-0.00	10.00	1	12	0.5000	496.062	A	64.489	37.355	32.137	31.55	0.000	0.000
						B	82.249	41.887		25.89		
						C	70.667	40.646		28.87		

Tower Pressure - Service

$G_H = 1.117$

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
T1 192.00-180.00	186.00	1.639	10	82.675	A	7.480	5.750	5.750	43.46	0.000	0.000
					B	6.325	17.630		24.00		

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
					C	7.480	5.750		43.46		
T2 180.00-160.00	170.00	1.597	10	158.198	A	11.834	9.600	9.600	44.79	0.000	0.000
					B	7.097	69.000		12.62		
					C	10.650	24.450		27.35		
T3 160.00-140.00	150.00	1.541	10	200.341	A	14.097	14.587	11.687	40.75	0.000	0.000
					B	9.809	71.087		14.45		
					C	10.561	61.187		16.29		
T4 140.00-120.00	130.00	1.48	9	243.410	A	13.872	50.527	15.027	23.33	0.000	0.000
					B	12.155	74.427		17.36		
					C	12.866	64.527		19.42		
T5 120.00-100.00	110.00	1.411	9	286.083	A	19.344	54.075	18.575	25.30	0.000	0.000
					B	17.353	78.458		19.39		
					C	18.178	68.558		21.42		
T6 100.00-80.00	90.00	1.332	9	328.055	A	18.689	57.620	22.120	28.99	0.000	0.000
					B	17.040	82.487		22.23		
					C	17.723	72.587		24.49		
T7 80.00-60.00	70.00	1.24	8	369.558	A	23.819	57.626	22.126	27.17	0.000	0.000
					B	21.994	82.492		21.18		
					C	22.750	72.592		23.21		
T8 60.00-40.00	50.00	1.126	7	414.393	A	26.163	64.298	28.798	31.83	0.000	0.000
					B	24.381	89.165		25.36		
					C	25.119	79.265		27.59		
T9 40.00-20.00	30.00	1	6	454.393	A	28.572	64.298	28.798	31.01	0.000	0.000
					B	26.822	89.165		24.83		
					C	27.547	79.265		26.96		
T10 20.00-0.00	10.00	1	6	494.393	A	31.988	51.548	28.798	34.47	0.000	0.000
					B	30.592	71.695		28.15		
					C	31.388	60.681		31.28		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	169.68	546.13	A	0.16	2.735	0.583	1	1	10.833	1193.36	99.45	B
			B	0.29	2.324	0.613	1	1	17.129			
			C	0.16	2.735	0.583	1	1	10.833			
T2 180.00-160.00	626.00	883.52	A	0.135	2.826	0.579	1	1	17.396	3071.05	153.55	B
			B	0.481	1.926	0.688	1	1	54.569			
			C	0.222	2.525	0.595	1	1	25.200			
T3 160.00-140.00	859.40	1476.68	A	0.143	2.797	0.58	1	1	22.564	3261.09	163.05	B
			B	0.404	2.057	0.653	1	1	56.241			
			C	0.358	2.153	0.635	1	1	49.440			
T4 140.00-120.00	1061.60	1889.30	A	0.265	2.395	0.606	1	1	44.476	3468.92	173.45	B
			B	0.356	2.158	0.635	1	1	59.381			
			C	0.318	2.249	0.622	1	1	52.973			
T5 120.00-100.00	1064.10	2605.18	A	0.257	2.418	0.604	1	1	51.983	3791.23	189.56	B
			B	0.335	2.207	0.627	1	1	66.563			
			C	0.303	2.288	0.617	1	1	60.470			
T6 100.00-80.00	1066.60	2666.47	A	0.233	2.491	0.598	1	1	53.122	3785.49	189.27	B
			B	0.303	2.287	0.617	1	1	67.929			
			C	0.275	2.364	0.609	1	1	61.903			
T7 80.00-60.00	1066.60	3345.61	A	0.22	2.529	0.595	1	1	58.093	3845.69	192.28	B
			B	0.283	2.343	0.611	1	1	72.378			
			C	0.258	2.414	0.604	1	1	66.592			
T8 60.00-	1066.60	4179.30	A	0.218	2.536	0.594	1	1	64.375	3834.09	191.70	B

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
40.00			B	0.274	2.367	0.608	1	1	78.619			
			C	0.252	2.432	0.602	1	1	72.865			
T9 40.00-20.00	1066.60	4356.19	A	0.204	2.581	0.591	1	1	66.592	3571.25	178.56	B
			B	0.255	2.422	0.603	1	1	80.608			
			C	0.235	2.483	0.598	1	1	74.961			
T10 20.00-0.00	761.05	5024.30	A	0.169	2.703	0.585	1	1	62.121	3437.34	171.87	B
			B	0.207	2.573	0.592	1	1	73.024			
			C	0.186	2.643	0.588	1	1	67.049			
Sum Weight:	8808.23	26972.68						OTM	3044308.26 lb-ft	33259.51		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	169.68	546.13	A	0.16	2.735	0.583	0.825	1	9.524	1116.24	93.02	B
			B	0.29	2.324	0.613	0.825	1	16.022			
			C	0.16	2.735	0.583	0.825	1	9.524			
T2 180.00-160.00	626.00	883.52	A	0.135	2.826	0.579	0.825	1	15.325	3001.15	150.06	B
			B	0.481	1.926	0.688	0.825	1	53.327			
			C	0.222	2.525	0.595	0.825	1	23.336			
T3 160.00-140.00	859.40	1476.68	A	0.143	2.797	0.58	0.825	1	20.097	3161.55	158.08	B
			B	0.404	2.057	0.653	0.825	1	54.524			
			C	0.358	2.153	0.635	0.825	1	47.592			
T4 140.00-120.00	1061.60	1889.30	A	0.265	2.395	0.606	0.825	1	42.048	3344.66	167.23	B
			B	0.356	2.158	0.635	0.825	1	57.254			
			C	0.318	2.249	0.622	0.825	1	50.722			
T5 120.00-100.00	1064.10	2605.18	A	0.257	2.418	0.604	0.825	1	48.598	3618.26	180.91	B
			B	0.335	2.207	0.627	0.825	1	63.526			
			C	0.303	2.288	0.617	0.825	1	57.289			
T6 100.00-80.00	1066.60	2666.47	A	0.233	2.491	0.598	0.825	1	49.852	3619.31	180.97	B
			B	0.303	2.287	0.617	0.825	1	64.947			
			C	0.275	2.364	0.609	0.825	1	58.801			
T7 80.00-60.00	1066.60	3345.61	A	0.22	2.529	0.595	0.825	1	53.925	3641.18	182.06	B
			B	0.283	2.343	0.611	0.825	1	68.529			
			C	0.258	2.414	0.604	0.825	1	62.611			
T8 60.00-40.00	1066.60	4179.30	A	0.218	2.536	0.594	0.825	1	59.797	3626.02	181.30	B
			B	0.274	2.367	0.608	0.825	1	74.352			
			C	0.252	2.432	0.602	0.825	1	68.469			
T9 40.00-20.00	1066.60	4356.19	A	0.204	2.581	0.591	0.825	1	61.592	3363.30	168.17	B
			B	0.255	2.422	0.603	0.825	1	75.915			
			C	0.235	2.483	0.598	0.825	1	70.141			
T10 20.00-0.00	761.05	5024.30	A	0.169	2.703	0.585	0.825	1	56.523	3185.33	159.27	B
			B	0.207	2.573	0.592	0.825	1	67.670			
			C	0.186	2.643	0.588	0.825	1	61.556			
Sum Weight:	8808.23	26972.68						OTM	2919536.84 lb-ft	31677.00		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	169.68	546.13	A	0.16	2.735	0.583	0.8	1	9.337	1105.22	92.10	B
			B	0.29	2.324	0.613	0.8	1	15.864			
			C	0.16	2.735	0.583	0.8	1	9.337			
T2 180.00-160.00	626.00	883.52	A	0.135	2.826	0.579	0.8	1	15.029	2991.17	149.56	B
			B	0.481	1.926	0.688	0.8	1	53.150			
			C	0.222	2.525	0.595	0.8	1	23.070			
T3 160.00-140.00	859.40	1476.68	A	0.143	2.797	0.58	0.8	1	19.745	3147.33	157.37	B
			B	0.404	2.057	0.653	0.8	1	54.279			
			C	0.358	2.153	0.635	0.8	1	47.328			
T4 140.00-120.00	1061.60	1889.30	A	0.265	2.395	0.606	0.8	1	41.702	3326.90	166.35	B
			B	0.356	2.158	0.635	0.8	1	56.950			
			C	0.318	2.249	0.622	0.8	1	50.400			
T5 120.00-100.00	1064.10	2605.18	A	0.257	2.418	0.604	0.8	1	48.114	3593.55	179.68	B
			B	0.335	2.207	0.627	0.8	1	63.092			
			C	0.303	2.288	0.617	0.8	1	56.834			
T6 100.00-80.00	1066.60	2666.47	A	0.233	2.491	0.598	0.8	1	49.385	3595.57	179.78	B
			B	0.303	2.287	0.617	0.8	1	64.521			
			C	0.275	2.364	0.609	0.8	1	58.358			
T7 80.00-60.00	1066.60	3345.61	A	0.22	2.529	0.595	0.8	1	53.329	3611.97	180.60	B
			B	0.283	2.343	0.611	0.8	1	67.979			
			C	0.258	2.414	0.604	0.8	1	62.042			
T8 60.00-40.00	1066.60	4179.30	A	0.218	2.536	0.594	0.8	1	59.143	3596.29	179.81	B
			B	0.274	2.367	0.608	0.8	1	73.743			
			C	0.252	2.432	0.602	0.8	1	67.841			
T9 40.00-20.00	1066.60	4356.19	A	0.204	2.581	0.591	0.8	1	60.877	3333.59	166.68	B
			B	0.255	2.422	0.603	0.8	1	75.244			
			C	0.235	2.483	0.598	0.8	1	69.452			
T10 20.00-0.00	761.05	5024.30	A	0.169	2.703	0.585	0.8	1	55.723	3149.33	157.47	B
			B	0.207	2.573	0.592	0.8	1	66.905			
			C	0.186	2.643	0.588	0.8	1	60.772			
Sum Weight:	8808.23	26972.68						OTM	2901712.36 lb-ft	31450.93		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	169.68	546.13	A	0.16	2.735	0.583	0.85	1	9.711	1127.26	93.94	B
			B	0.29	2.324	0.613	0.85	1	16.180			
			C	0.16	2.735	0.583	0.85	1	9.711			
T2 180.00-160.00	626.00	883.52	A	0.135	2.826	0.579	0.85	1	15.621	3011.14	150.56	B
			B	0.481	1.926	0.688	0.85	1	53.505			
			C	0.222	2.525	0.595	0.85	1	23.603			
T3 160.00-140.00	859.40	1476.68	A	0.143	2.797	0.58	0.85	1	20.450	3175.77	158.79	B
			B	0.404	2.057	0.653	0.85	1	54.769			
			C	0.358	2.153	0.635	0.85	1	47.856			
T4 140.00-120.00	1061.60	1889.30	A	0.265	2.395	0.606	0.85	1	42.395	3362.41	168.12	B
			B	0.356	2.158	0.635	0.85	1	57.558			
			C	0.318	2.249	0.622	0.85	1	51.043			
T5 120.00-100.00	1064.10	2605.18	A	0.257	2.418	0.604	0.85	1	49.081	3642.97	182.15	B
			B	0.335	2.207	0.627	0.85	1	63.960			
			C	0.303	2.288	0.617	0.85	1	57.743			
T6 100.00-80.00	1066.60	2666.47	A	0.233	2.491	0.598	0.85	1	50.319	3643.05	182.15	B
			B	0.303	2.287	0.617	0.85	1	65.373			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.275	2.364	0.609	0.85	1	59.244			
T7 80.00-60.00	1066.60	3345.61	A	0.22	2.529	0.595	0.85	1	54.520	3670.40	183.52	B
			B	0.283	2.343	0.611	0.85	1	69.079			
			C	0.258	2.414	0.604	0.85	1	63.179			
T8 60.00-40.00	1066.60	4179.30	A	0.218	2.536	0.594	0.85	1	60.451	3655.74	182.79	B
			B	0.274	2.367	0.608	0.85	1	74.962			
			C	0.252	2.432	0.602	0.85	1	69.097			
T9 40.00-20.00	1066.60	4356.19	A	0.204	2.581	0.591	0.85	1	62.306	3393.01	169.65	B
			B	0.255	2.422	0.603	0.85	1	76.585			
			C	0.235	2.483	0.598	0.85	1	70.829			
T10 20.00-0.00	761.05	5024.30	A	0.169	2.703	0.585	0.85	1	57.323	3221.33	161.07	B
			B	0.207	2.573	0.592	0.85	1	68.435			
			C	0.186	2.643	0.588	0.85	1	62.341			
Sum Weight:	8808.23	26972.68						OTM	2937361.3 3 lb-ft	31903.07		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	292.87	898.58	A	0.216	2.543	0.594	1	1	14.932	1333.00	111.08	B
			B	0.383	2.098	0.645	1	1	28.251			
			C	0.224	2.518	0.596	1	1	15.613			
T2 180.00-160.00	1379.76	1433.44	A	0.18	2.665	0.586	1	1	23.367	3636.92	181.85	B
			B	0.612	1.797	0.761	1	1	92.338			
			C	0.293	2.315	0.614	1	1	40.867			
T3 160.00-140.00	1997.50	2117.50	A	0.192	2.624	0.589	1	1	31.999	3815.66	190.78	B
			B	0.51	1.887	0.703	1	1	95.606			
			C	0.455	1.966	0.675	1	1	83.717			
T4 140.00-120.00	2535.35	2640.38	A	0.347	2.18	0.631	1	1	75.345	4023.16	201.16	B
			B	0.446	1.979	0.672	1	1	100.132			
			C	0.4	2.063	0.652	1	1	88.298			
T5 120.00-100.00	2544.45	3578.70	A	0.328	2.224	0.625	1	1	83.308	4270.26	213.51	B
			B	0.417	2.032	0.659	1	1	108.599			
			C	0.378	2.109	0.643	1	1	96.940			
T6 100.00-80.00	2553.55	3626.27	A	0.294	2.313	0.614	1	1	84.061	4268.46	213.42	B
			B	0.377	2.112	0.642	1	1	110.587			
			C	0.342	2.19	0.63	1	1	98.724			
T7 80.00-60.00	2553.55	4467.76	A	0.275	2.363	0.609	1	1	89.328	4270.16	213.51	B
			B	0.349	2.174	0.632	1	1	115.457			
			C	0.318	2.248	0.622	1	1	103.768			
T8 60.00-40.00	2553.55	5451.68	A	0.268	2.383	0.607	1	1	96.077	4173.77	208.69	B
			B	0.334	2.21	0.627	1	1	122.263			
			C	0.307	2.278	0.618	1	1	110.544			
T9 40.00-20.00	2553.55	5704.23	A	0.251	2.434	0.602	1	1	98.728	3882.10	194.11	B
			B	0.311	2.267	0.619	1	1	124.798			
			C	0.286	2.334	0.612	1	1	113.119			
T10 20.00-0.00	1756.02	6449.19	A	0.205	2.578	0.591	1	1	86.585	3592.77	179.64	B
			B	0.25	2.437	0.602	1	1	107.463			
			C	0.224	2.517	0.596	1	1	94.879			
Sum Weight:	20720.15	36367.72						OTM	3475453.3 5 lb-ft	37266.25		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	292.87	898.58	A	0.216	2.543	0.594	0.825	1	13.124	1156.86	96.40	B
			B	0.383	2.098	0.645	0.825	1	24.518			
			C	0.224	2.518	0.596	0.825	1	13.688			
T2 180.00-160.00	1379.76	1433.44	A	0.18	2.665	0.586	0.825	1	20.606	3120.42	156.02	B
			B	0.612	1.797	0.761	0.825	1	79.224			
			C	0.293	2.315	0.614	0.825	1	35.371			
T3 160.00-140.00	1997.50	2117.50	A	0.192	2.624	0.589	0.825	1	28.083	3270.41	163.52	B
			B	0.51	1.887	0.703	0.825	1	81.944			
			C	0.455	1.966	0.675	0.825	1	72.016			
T4 140.00-120.00	2535.35	2640.38	A	0.347	2.18	0.631	0.825	1	65.028	3452.75	172.64	B
			B	0.446	1.979	0.672	0.825	1	85.935			
			C	0.4	2.063	0.652	0.825	1	76.074			
T5 120.00-100.00	2544.45	3578.70	A	0.328	2.224	0.625	0.825	1	71.956	3673.25	183.66	B
			B	0.417	2.032	0.659	0.825	1	93.416			
			C	0.378	2.109	0.643	0.825	1	83.707			
T6 100.00-80.00	2553.55	3626.27	A	0.294	2.313	0.614	0.825	1	72.902	3686.47	184.32	B
			B	0.377	2.112	0.642	0.825	1	95.508			
			C	0.342	2.19	0.63	0.825	1	85.638			
T7 80.00-60.00	2553.55	4467.76	A	0.275	2.363	0.609	0.825	1	77.218	3678.45	183.92	B
			B	0.349	2.174	0.632	0.825	1	99.458			
			C	0.318	2.248	0.622	0.825	1	89.746			
T8 60.00-40.00	2553.55	5451.68	A	0.268	2.383	0.607	0.825	1	83.483	3610.78	180.54	B
			B	0.334	2.21	0.627	0.825	1	105.771			
			C	0.307	2.278	0.618	0.825	1	96.033			
T9 40.00-20.00	2553.55	5704.23	A	0.251	2.434	0.602	0.825	1	85.638	3353.45	167.67	B
			B	0.311	2.267	0.619	0.825	1	107.803			
			C	0.286	2.334	0.612	0.825	1	98.109			
T10 20.00-0.00	1756.02	6449.19	A	0.205	2.578	0.591	0.825	1	75.299	3111.55	155.58	B
			B	0.25	2.437	0.602	0.825	1	93.069			
			C	0.224	2.517	0.596	0.825	1	82.512			
Sum Weight:	20720.15	36367.72						OTM	2990656.18 lb-ft	32114.40		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	292.87	898.58	A	0.216	2.543	0.594	0.8	1	12.866	1131.70	94.31	B
			B	0.383	2.098	0.645	0.8	1	23.985			
			C	0.224	2.518	0.596	0.8	1	13.413			
T2 180.00-160.00	1379.76	1433.44	A	0.18	2.665	0.586	0.8	1	20.211	3046.63	152.33	B
			B	0.612	1.797	0.761	0.8	1	77.351			
			C	0.293	2.315	0.614	0.8	1	34.586			
T3 160.00-140.00	1997.50	2117.50	A	0.192	2.624	0.589	0.8	1	27.523	3192.52	159.63	B
			B	0.51	1.887	0.703	0.8	1	79.993			
			C	0.455	1.966	0.675	0.8	1	70.345			
T4 140.00-120.00	2535.35	2640.38	A	0.347	2.18	0.631	0.8	1	63.554	3371.27	168.56	B
			B	0.446	1.979	0.672	0.8	1	83.907			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.4	2.063	0.652	0.8	1	74.328			
T5 120.00-100.00	2544.45	3578.70	A	0.328	2.224	0.625	0.8	1	70.335	3587.97	179.40	B
			B	0.417	2.032	0.659	0.8	1	91.247			
			C	0.378	2.109	0.643	0.8	1	81.816			
T6 100.00-80.00	2553.55	3626.27	A	0.294	2.313	0.614	0.8	1	71.308	3603.33	180.17	B
			B	0.377	2.112	0.642	0.8	1	93.354			
			C	0.342	2.19	0.63	0.8	1	83.768			
T7 80.00-60.00	2553.55	4467.76	A	0.275	2.363	0.609	0.8	1	75.488	3593.93	179.70	B
			B	0.349	2.174	0.632	0.8	1	97.173			
			C	0.318	2.248	0.622	0.8	1	87.743			
T8 60.00-40.00	2553.55	5451.68	A	0.268	2.383	0.607	0.8	1	81.684	3530.35	176.52	B
			B	0.334	2.21	0.627	0.8	1	103.415			
			C	0.307	2.278	0.618	0.8	1	93.960			
T9 40.00-20.00	2553.55	5704.23	A	0.251	2.434	0.602	0.8	1	83.768	3277.92	163.90	B
			B	0.311	2.267	0.619	0.8	1	105.375			
			C	0.286	2.334	0.612	0.8	1	95.965			
T10 20.00-0.00	1756.02	6449.19	A	0.205	2.578	0.591	0.8	1	73.687	3042.81	152.14	B
			B	0.25	2.437	0.602	0.8	1	91.013			
			C	0.224	2.517	0.596	0.8	1	80.746			
Sum Weight:	20720.15	36367.72						OTM	2921399.44 lb-ft	31378.42		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	292.87	898.58	A	0.216	2.543	0.594	0.85	1	13.383	1182.02	98.50	B
			B	0.383	2.098	0.645	0.85	1	25.051			
			C	0.224	2.518	0.596	0.85	1	13.963			
T2 180.00-160.00	1379.76	1433.44	A	0.18	2.665	0.586	0.85	1	21.000	3194.20	159.71	B
			B	0.612	1.797	0.761	0.85	1	81.098			
			C	0.293	2.315	0.614	0.85	1	36.157			
T3 160.00-140.00	1997.50	2117.50	A	0.192	2.624	0.589	0.85	1	28.642	3348.30	167.42	B
			B	0.51	1.887	0.703	0.85	1	83.896			
			C	0.455	1.966	0.675	0.85	1	73.688			
T4 140.00-120.00	2535.35	2640.38	A	0.347	2.18	0.631	0.85	1	66.502	3534.24	176.71	B
			B	0.446	1.979	0.672	0.85	1	87.963			
			C	0.4	2.063	0.652	0.85	1	77.820			
T5 120.00-100.00	2544.45	3578.70	A	0.328	2.224	0.625	0.85	1	73.578	3758.54	187.93	B
			B	0.417	2.032	0.659	0.85	1	95.585			
			C	0.378	2.109	0.643	0.85	1	85.597			
T6 100.00-80.00	2553.55	3626.27	A	0.294	2.313	0.614	0.85	1	74.496	3769.61	188.48	B
			B	0.377	2.112	0.642	0.85	1	97.662			
			C	0.342	2.19	0.63	0.85	1	87.507			
T7 80.00-60.00	2553.55	4467.76	A	0.275	2.363	0.609	0.85	1	78.948	3762.98	188.15	B
			B	0.349	2.174	0.632	0.85	1	101.744			
			C	0.318	2.248	0.622	0.85	1	91.749			
T8 60.00-40.00	2553.55	5451.68	A	0.268	2.383	0.607	0.85	1	85.282	3691.20	184.56	B
			B	0.334	2.21	0.627	0.85	1	108.127			
			C	0.307	2.278	0.618	0.85	1	98.106			
T9 40.00-20.00	2553.55	5704.23	A	0.251	2.434	0.602	0.85	1	87.508	3428.97	171.45	B
			B	0.311	2.267	0.619	0.85	1	110.231			
			C	0.286	2.334	0.612	0.85	1	100.253			
T10 20.00-	1756.02	6449.19	A	0.205	2.578	0.591	0.85	1	76.911	3180.30	159.01	B

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
0.00			B	0.25	2.437	0.602	0.85	1	95.125			
			C	0.224	2.517	0.596	0.85	1	84.279			
Sum Weight:	20720.15	36367.72						OTM	3059912.9 2 lb-ft	32850.38		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	169.68	546.13	A	0.16	2.735	0.583	1	1	10.833	466.15	38.85	B
			B	0.29	2.324	0.613	1	1	17.129			
			C	0.16	2.735	0.583	1	1	10.833			
T2 180.00-160.00	626.00	883.52	A	0.135	2.826	0.579	1	1	17.396	1199.63	59.98	B
			B	0.481	1.926	0.688	1	1	54.569			
			C	0.222	2.525	0.595	1	1	25.200			
T3 160.00-140.00	859.40	1476.68	A	0.143	2.797	0.58	1	1	22.564	1273.86	63.69	B
			B	0.404	2.057	0.653	1	1	56.241			
			C	0.358	2.153	0.635	1	1	49.440			
T4 140.00-120.00	1061.60	1889.30	A	0.265	2.395	0.606	1	1	44.476	1355.05	67.75	B
			B	0.356	2.158	0.635	1	1	59.381			
			C	0.318	2.249	0.622	1	1	52.973			
T5 120.00-100.00	1064.10	2605.18	A	0.257	2.418	0.604	1	1	51.983	1480.95	74.05	B
			B	0.335	2.207	0.627	1	1	66.563			
			C	0.303	2.288	0.617	1	1	60.470			
T6 100.00-80.00	1066.60	2666.47	A	0.233	2.491	0.598	1	1	53.122	1478.71	73.94	B
			B	0.303	2.287	0.617	1	1	67.929			
			C	0.275	2.364	0.609	1	1	61.903			
T7 80.00-60.00	1066.60	3345.61	A	0.22	2.529	0.595	1	1	58.093	1502.22	75.11	B
			B	0.283	2.343	0.611	1	1	72.378			
			C	0.258	2.414	0.604	1	1	66.592			
T8 60.00-40.00	1066.60	4179.30	A	0.218	2.536	0.594	1	1	64.375	1497.69	74.88	B
			B	0.274	2.367	0.608	1	1	78.619			
			C	0.252	2.432	0.602	1	1	72.865			
T9 40.00-20.00	1066.60	4356.19	A	0.204	2.581	0.591	1	1	66.592	1395.02	69.75	B
			B	0.255	2.422	0.603	1	1	80.608			
			C	0.235	2.483	0.598	1	1	74.961			
T10 20.00-0.00	761.05	5024.30	A	0.169	2.703	0.585	1	1	62.121	1342.71	67.14	B
			B	0.207	2.573	0.592	1	1	73.024			
			C	0.186	2.643	0.588	1	1	67.049			
Sum Weight:	8808.23	26972.68						OTM	1189182.9 1 lb-ft	12992.00		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-	169.68	546.13	A	0.16	2.735	0.583	0.825	1	9.524	436.03	36.34	B

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
180.00			B	0.29	2.324	0.613	0.825	1	16.022			
			C	0.16	2.735	0.583	0.825	1	9.524			
T2 180.00-160.00	626.00	883.52	A	0.135	2.826	0.579	0.825	1	15.325	1172.33	58.62	B
			B	0.481	1.926	0.688	0.825	1	53.327			
			C	0.222	2.525	0.595	0.825	1	23.336			
T3 160.00-140.00	859.40	1476.68	A	0.143	2.797	0.58	0.825	1	20.097	1234.98	61.75	B
			B	0.404	2.057	0.653	0.825	1	54.524			
			C	0.358	2.153	0.635	0.825	1	47.592			
T4 140.00-120.00	1061.60	1889.30	A	0.265	2.395	0.606	0.825	1	42.048	1306.51	65.33	B
			B	0.356	2.158	0.635	0.825	1	57.254			
			C	0.318	2.249	0.622	0.825	1	50.722			
T5 120.00-100.00	1064.10	2605.18	A	0.257	2.418	0.604	0.825	1	48.598	1413.38	70.67	B
			B	0.335	2.207	0.627	0.825	1	63.526			
			C	0.303	2.288	0.617	0.825	1	57.289			
T6 100.00-80.00	1066.60	2666.47	A	0.233	2.491	0.598	0.825	1	49.852	1413.79	70.69	B
			B	0.303	2.287	0.617	0.825	1	64.947			
			C	0.275	2.364	0.609	0.825	1	58.801			
T7 80.00-60.00	1066.60	3345.61	A	0.22	2.529	0.595	0.825	1	53.925	1422.34	71.12	B
			B	0.283	2.343	0.611	0.825	1	68.529			
			C	0.258	2.414	0.604	0.825	1	62.611			
T8 60.00-40.00	1066.60	4179.30	A	0.218	2.536	0.594	0.825	1	59.797	1416.41	70.82	B
			B	0.274	2.367	0.608	0.825	1	74.352			
			C	0.252	2.432	0.602	0.825	1	68.469			
T9 40.00-20.00	1066.60	4356.19	A	0.204	2.581	0.591	0.825	1	61.592	1313.79	65.69	B
			B	0.255	2.422	0.603	0.825	1	75.915			
			C	0.235	2.483	0.598	0.825	1	70.141			
T10 20.00-0.00	761.05	5024.30	A	0.169	2.703	0.585	0.825	1	56.523	1244.27	62.21	B
			B	0.207	2.573	0.592	0.825	1	67.670			
			C	0.186	2.643	0.588	0.825	1	61.556			
Sum Weight:	8808.23	26972.68						OTM	1140444.08 lb-ft	12373.83		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	169.68	546.13	A	0.16	2.735	0.583	0.8	1	9.337	431.73	35.98	B
			B	0.29	2.324	0.613	0.8	1	15.864			
			C	0.16	2.735	0.583	0.8	1	9.337			
T2 180.00-160.00	626.00	883.52	A	0.135	2.826	0.579	0.8	1	15.029	1168.42	58.42	B
			B	0.481	1.926	0.688	0.8	1	53.150			
			C	0.222	2.525	0.595	0.8	1	23.070			
T3 160.00-140.00	859.40	1476.68	A	0.143	2.797	0.58	0.8	1	19.745	1229.43	61.47	B
			B	0.404	2.057	0.653	0.8	1	54.279			
			C	0.358	2.153	0.635	0.8	1	47.328			
T4 140.00-120.00	1061.60	1889.30	A	0.265	2.395	0.606	0.8	1	41.702	1299.57	64.98	B
			B	0.356	2.158	0.635	0.8	1	56.950			
			C	0.318	2.249	0.622	0.8	1	50.400			
T5 120.00-100.00	1064.10	2605.18	A	0.257	2.418	0.604	0.8	1	48.114	1403.73	70.19	B
			B	0.335	2.207	0.627	0.8	1	63.092			
			C	0.303	2.288	0.617	0.8	1	56.834			
T6 100.00-80.00	1066.60	2666.47	A	0.233	2.491	0.598	0.8	1	49.385	1404.52	70.23	B
			B	0.303	2.287	0.617	0.8	1	64.521			
			C	0.275	2.364	0.609	0.8	1	58.358			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T7 80.00-60.00	1066.60	3345.61	A	0.22	2.529	0.595	0.8	1	53.329	1410.92	70.55	B
			B	0.283	2.343	0.611	0.8	1	67.979			
			C	0.258	2.414	0.604	0.8	1	62.042			
T8 60.00-40.00	1066.60	4179.30	A	0.218	2.536	0.594	0.8	1	59.143	1404.80	70.24	B
			B	0.274	2.367	0.608	0.8	1	73.743			
			C	0.252	2.432	0.602	0.8	1	67.841			
T9 40.00-20.00	1066.60	4356.19	A	0.204	2.581	0.591	0.8	1	60.877	1302.18	65.11	B
			B	0.255	2.422	0.603	0.8	1	75.244			
			C	0.235	2.483	0.598	0.8	1	69.452			
T10 20.00-0.00	761.05	5024.30	A	0.169	2.703	0.585	0.8	1	55.723	1230.21	61.51	B
			B	0.207	2.573	0.592	0.8	1	66.905			
			C	0.186	2.643	0.588	0.8	1	60.772			
Sum Weight:	8808.23	26972.68						OTM	1133481.39 lb-ft	12285.52		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 192.00-180.00	169.68	546.13	A	0.16	2.735	0.583	0.85	1	9.711	440.33	36.69	B
			B	0.29	2.324	0.613	0.85	1	16.180			
			C	0.16	2.735	0.583	0.85	1	9.711			
T2 180.00-160.00	626.00	883.52	A	0.135	2.826	0.579	0.85	1	15.621	1176.23	58.81	B
			B	0.481	1.926	0.688	0.85	1	53.505			
			C	0.222	2.525	0.595	0.85	1	23.603			
T3 160.00-140.00	859.40	1476.68	A	0.143	2.797	0.58	0.85	1	20.450	1240.53	62.03	B
			B	0.404	2.057	0.653	0.85	1	54.769			
			C	0.358	2.153	0.635	0.85	1	47.856			
T4 140.00-120.00	1061.60	1889.30	A	0.265	2.395	0.606	0.85	1	42.395	1313.44	65.67	B
			B	0.356	2.158	0.635	0.85	1	57.558			
			C	0.318	2.249	0.622	0.85	1	51.043			
T5 120.00-100.00	1064.10	2605.18	A	0.257	2.418	0.604	0.85	1	49.081	1423.04	71.15	B
			B	0.335	2.207	0.627	0.85	1	63.960			
			C	0.303	2.288	0.617	0.85	1	57.743			
T6 100.00-80.00	1066.60	2666.47	A	0.233	2.491	0.598	0.85	1	50.319	1423.07	71.15	B
			B	0.303	2.287	0.617	0.85	1	65.373			
			C	0.275	2.364	0.609	0.85	1	59.244			
T7 80.00-60.00	1066.60	3345.61	A	0.22	2.529	0.595	0.85	1	54.520	1433.75	71.69	B
			B	0.283	2.343	0.611	0.85	1	69.079			
			C	0.258	2.414	0.604	0.85	1	63.179			
T8 60.00-40.00	1066.60	4179.30	A	0.218	2.536	0.594	0.85	1	60.451	1428.02	71.40	B
			B	0.274	2.367	0.608	0.85	1	74.962			
			C	0.252	2.432	0.602	0.85	1	69.097			
T9 40.00-20.00	1066.60	4356.19	A	0.204	2.581	0.591	0.85	1	62.306	1325.39	66.27	B
			B	0.255	2.422	0.603	0.85	1	76.585			
			C	0.235	2.483	0.598	0.85	1	70.829			
T10 20.00-0.00	761.05	5024.30	A	0.169	2.703	0.585	0.85	1	57.323	1258.33	62.92	B
			B	0.207	2.573	0.592	0.85	1	68.435			
			C	0.186	2.643	0.588	0.85	1	62.341			
Sum Weight:	8808.23	26972.68						OTM	1147406.77 lb-ft	12462.14		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	12380.75					
Bracing Weight	14591.93					
Total Member Self-Weight	26972.68			16530.26	-14375.83	
Total Weight	42733.42			16530.26	-14375.83	
Wind 0 deg - No Ice		0.00	-44790.58	-4928681.42	-14375.83	20755.50
Wind 30 deg - No Ice		21717.07	-37615.07	-4173529.93	-2433508.20	29299.58
Wind 45 deg - No Ice		30552.72	-30552.72	-3392035.74	-3422941.83	30897.92
Wind 60 deg - No Ice		37223.50	-21491.00	-2384777.63	-4173563.09	30378.51
Wind 90 deg - No Ice		43434.14	0.00	16530.26	-4852640.58	24058.29
Wind 120 deg - No Ice		38789.78	22395.29	2489136.10	-4297054.77	11333.68
Wind 135 deg - No Ice		30552.72	30552.72	3425096.26	-3422941.83	2887.12
Wind 150 deg - No Ice		21717.07	37615.07	4206590.45	-2433508.20	-5241.29
Wind 180 deg - No Ice		0.00	42982.00	4819146.04	-14375.83	-19671.08
Wind 210 deg - No Ice		-21717.07	37615.07	4206590.45	2404756.55	-29299.58
Wind 225 deg - No Ice		-30552.72	30552.72	3425096.26	3394190.17	-30897.92
Wind 240 deg - No Ice		-38789.78	22395.29	2489136.10	4268303.11	-32089.19
Wind 270 deg - No Ice		-43434.14	0.00	16530.26	4823888.93	-24058.29
Wind 300 deg - No Ice		-37223.50	-21491.00	-2384777.63	4144811.44	-10707.43
Wind 315 deg - No Ice		-30552.72	-30552.72	-3392035.74	3394190.17	-2887.12
Wind 330 deg - No Ice		-21717.07	-37615.07	-4173529.93	2404756.55	5241.29
Member Ice	9395.04					
Total Weight Ice	67353.22			35519.15	-30522.00	
Wind 0 deg - Ice		0.00	-47687.25	-5163296.72	-30522.00	23270.28
Wind 30 deg - Ice		21635.69	-37474.11	-4106918.89	-2422159.72	28272.75
Wind 45 deg - Ice		30077.06	-30077.06	-3297795.44	-3363836.59	28775.62
Wind 60 deg - Ice		36199.35	-20899.71	-2286861.83	-4053003.85	27326.27
Wind 90 deg - Ice		43271.37	0.00	35519.15	-4813797.44	21280.93
Wind 120 deg - Ice		41298.37	23843.62	2634927.09	-4532828.61	9190.22
Wind 135 deg - Ice		30077.06	30077.06	3368833.74	-3363836.59	668.19
Wind 150 deg - Ice		21635.69	37474.11	4177957.20	-2422159.72	-6991.81
Wind 180 deg - Ice		0.00	41799.41	4680281.12	-30522.00	-19389.91
Wind 210 deg - Ice		-21635.69	37474.11	4177957.20	2361115.72	-28272.75
Wind 225 deg - Ice		-30077.06	30077.06	3368833.74	3302792.60	-28775.62
Wind 240 deg - Ice		-41298.37	23843.62	2634927.09	4471784.62	-32460.51
Wind 270 deg - Ice		-43271.37	0.00	35519.15	4752753.44	-21280.93
Wind 300 deg - Ice		-36199.35	-20899.71	-2286861.83	3991959.86	-7936.36
Wind 315 deg - Ice		-30077.06	-30077.06	-3297795.44	3302792.60	-668.19
Wind 330 deg - Ice		-21635.69	-37474.11	-4106918.89	2361115.72	6991.81
Total Weight	42733.42			16530.26	-14375.83	
Wind 0 deg - Service		0.00	-17496.32	-1931098.85	1081.60	8107.62
Wind 30 deg - Service		8483.23	-14693.39	-1636117.80	-943891.98	11445.15
Wind 45 deg - Service		11934.66	-11934.66	-1330846.63	-1330389.49	12069.50
Wind 60 deg - Service		14540.43	-8394.92	-937386.43	-1623600.92	11866.60
Wind 90 deg - Service		16966.46	0.00	624.46	-1888865.56	9397.77
Wind 120 deg - Service		15152.26	8748.16	966486.12	-1671839.86	4427.22
Wind 135 deg - Service		11934.66	11934.66	1332095.56	-1330389.49	1127.78
Wind 150 deg - Service		8483.23	14693.39	1637366.73	-943891.98	-2047.38
Wind 180 deg - Service		0.00	16789.84	1876646.25	1081.60	-7684.01
Wind 210 deg - Service		-8483.23	14693.39	1637366.73	946055.19	-11445.15
Wind 225 deg - Service		-11934.66	11934.66	1332095.56	1332552.70	-12069.50
Wind 240 deg - Service		-15152.26	8748.16	966486.12	1674003.07	-12534.84
Wind 270 deg - Service		-16966.46	0.00	624.46	1891028.77	-9397.77
Wind 300 deg - Service		-14540.43	-8394.92	-937386.43	1625764.13	-4182.59
Wind 315 deg - Service		-11934.66	-11934.66	-1330846.63	1332552.70	-1127.78
Wind 330 deg - Service		-8483.23	-14693.39	-1636117.80	946055.19	2047.38

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	192 - 180	Leg	Max Tension	5	2693.65	64.00	-25.20
			Max. Compression	19	-4446.51	24.24	81.99
			Max. Mx	23	-760.89	393.26	2.99
			Max. My	19	-621.93	38.26	-377.94
			Max. Vy	6	-389.99	0.00	-0.00
			Max. Vx	2	375.53	0.00	-0.00
		Diagonal	Max Tension	4	1184.02	0.00	0.00
			Max. Compression	30	-1263.92	0.00	0.00
			Max. Mx	21	-174.37	12.72	0.42
			Max. My	6	-1028.41	2.47	3.92
			Max. Vy	21	9.70	12.72	0.42
			Max. Vx	6	1.01	0.00	0.00
		Top Girt	Max Tension	22	117.95	0.00	0.00
			Max. Compression	19	-106.27	0.00	0.00
			Max. Mx	18	3.63	-21.32	0.00
			Max. My	20	2.34	0.00	0.00
			Max. Vy	18	12.82	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
T2	180 - 160	Leg	Max Tension	5	20575.58	-36.10	-26.83
			Max. Compression	24	-26847.72	60.08	11.08
			Max. Mx	30	-7572.99	82.59	14.60
			Max. My	3	-1454.94	-11.10	-193.15
			Max. Vy	15	-962.29	-52.26	-12.38
			Max. Vx	11	917.22	6.79	-72.52
		Diagonal	Max Tension	17	3733.33	0.00	0.00
			Max. Compression	17	-3712.37	0.00	0.00
			Max. Mx	24	3034.42	23.07	1.99
			Max. My	9	-2230.74	1.18	7.76
			Max. Vy	24	-13.84	23.07	1.99
			Max. Vx	34	2.14	0.00	0.00
T3	160 - 140	Leg	Max Tension	5	42839.41	-343.14	-36.72
			Max. Compression	24	-52882.89	23.32	-1.17
			Max. Mx	15	34274.42	528.22	-4.80
			Max. My	11	-3236.99	-7.89	-514.97
			Max. Vy	15	277.12	-346.54	-4.80
			Max. Vx	11	-316.00	-7.89	428.68
		Diagonal	Max Tension	17	5001.93	0.00	0.00
			Max. Compression	17	-5088.19	0.00	0.00
			Max. Mx	24	3701.48	51.08	4.18
			Max. My	27	-3896.70	13.33	7.70
			Max. Vy	24	-24.67	51.08	4.18
			Max. Vx	27	-1.91	0.00	0.00
T4	140 - 120	Leg	Max Tension	5	69815.54	-157.16	-25.63
			Max. Compression	24	-85306.98	291.26	-8.13
			Max. Mx	19	-83720.13	295.14	-21.41
			Max. My	3	-5157.07	4.08	-264.77
			Max. Vy	15	-917.74	-15.38	1.75
			Max. Vx	3	-894.41	-5.46	8.82
		Diagonal	Max Tension	17	5994.77	0.00	0.00
			Max. Compression	17	-6040.61	0.00	0.00
			Max. Mx	24	4904.37	55.18	4.25
			Max. My	28	-3204.54	32.00	8.26
			Max. Vy	22	27.77	52.84	-6.09
			Max. Vx	27	-1.92	0.00	0.00
T5	120 - 100	Leg	Max Tension	10	95530.84	-282.27	-12.17
			Max. Compression	24	-116336.06	527.67	-13.41
			Max. Mx	32	86053.41	-577.93	12.58
			Max. My	11	-6465.53	3.88	465.43
			Max. Vy	32	98.65	-577.93	12.58
			Max. Vx	16	-118.76	70.76	239.36

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
		Diagonal	Max Tension	14	6394.84	0.00	0.00
			Max. Compression	14	-6441.54	0.00	0.00
			Max. Mx	27	4560.59	78.09	8.03
			Max. My	21	-4665.12	49.66	-12.83
			Max. Vy	27	37.88	78.09	8.03
			Max. Vx	21	2.52	0.00	0.00
T6	100 - 80	Leg	Max Tension	10	117859.10	-462.38	26.53
			Max. Compression	24	-143955.90	618.88	-24.01
			Max. Mx	32	106511.83	-776.47	22.08
			Max. My	11	-7432.59	-47.30	845.02
			Max. Vy	32	115.38	-776.47	22.08
			Max. Vx	11	138.97	-47.30	845.02
		Diagonal	Max Tension	31	7513.51	0.00	0.00
			Max. Compression	14	-7597.55	0.00	0.00
			Max. Mx	24	6429.61	140.80	-12.13
			Max. My	22	-6182.84	58.16	-22.11
			Max. Vy	21	50.56	130.26	-15.38
			Max. Vx	22	3.64	0.00	0.00
T7	80 - 60	Leg	Max Tension	10	140345.12	-481.93	22.54
			Max. Compression	24	-173021.22	332.42	-23.75
			Max. Mx	32	127117.73	-1169.80	23.53
			Max. My	28	-15717.48	-460.43	814.82
			Max. Vy	32	170.15	-1169.80	23.53
			Max. Vx	30	-119.40	-856.42	780.92
		Diagonal	Max Tension	31	7770.39	0.00	0.00
			Max. Compression	30	-7776.11	0.00	0.00
			Max. Mx	24	6651.73	174.93	-16.09
			Max. My	21	-5396.34	101.69	-24.82
			Max. Vy	27	63.79	170.71	19.72
			Max. Vx	21	4.09	0.00	0.00
T8	60 - 40	Leg	Max Tension	10	162129.55	-1046.30	20.22
			Max. Compression	24	-202315.43	-696.38	-14.65
			Max. Mx	22	149074.22	-2617.41	-45.93
			Max. My	11	-10658.62	-56.47	951.82
			Max. Vy	32	349.99	-2616.54	18.07
			Max. Vx	11	-118.67	-56.47	951.82
		Diagonal	Max Tension	31	9060.49	0.00	0.00
			Max. Compression	31	-8702.22	0.00	0.00
			Max. Mx	24	6773.54	230.52	-20.05
			Max. My	21	-5515.59	137.78	-29.01
			Max. Vy	27	79.06	208.11	22.77
			Max. Vx	21	4.49	0.00	0.00
T9	40 - 20	Leg	Max Tension	10	183578.55	-895.60	19.05
			Max. Compression	24	-232111.85	-2419.78	-17.33
			Max. Mx	27	169461.74	-5014.09	32.91
			Max. My	11	-12524.53	-105.08	1315.18
			Max. Vy	32	761.92	-5009.30	15.92
			Max. Vx	11	187.70	-105.08	1315.18
		Diagonal	Max Tension	31	10552.25	0.00	0.00
			Max. Compression	31	-9901.74	0.00	0.00
			Max. Mx	27	5029.46	274.85	27.44
			Max. My	21	-7433.87	205.75	-33.77
			Max. Vy	27	86.79	274.85	27.44
			Max. Vx	21	4.87	0.00	0.00
T10	20 - 0	Leg	Max Tension	10	204017.49	-1001.97	17.18
			Max. Compression	24	-261140.12	-0.00	-0.04
			Max. Mx	24	-243515.93	5079.99	6.34
			Max. My	11	-14497.67	-135.89	2194.79
			Max. Vy	32	-903.36	-5009.30	15.92
			Max. Vx	11	308.13	-135.89	2194.79
		Diagonal	Max Tension	31	12504.47	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Compression	31	-11835.84	0.00	0.00
			Max. Mx	21	3475.83	410.74	36.10
			Max. My	22	-10628.34	317.56	-52.58
			Max. Vy	21	110.80	410.74	36.10
			Max. Vx	22	6.58	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	30	263225.34	21831.83	-11698.89
	Max. H_x	13	243129.98	24456.02	-13250.88
	Max. H_z	21	-189191.67	-24261.77	14171.22
	Min. Vert	5	-208426.92	-21422.51	11567.50
	Min. H_x	22	-193431.33	-25012.91	13746.40
	Min. H_z	13	243129.98	24456.02	-13250.88
Leg B	Max. Vert	24	265684.66	-21591.97	-12207.56
	Max. H_x	32	-190970.96	24757.82	14094.48
	Max. H_z	33	-186730.29	23906.05	14697.90
	Min. Vert	15	-207272.87	21179.50	11945.44
	Min. H_x	7	244283.55	-24230.85	-13683.52
	Min. H_z	7	244283.55	-24230.85	-13683.52
Leg A	Max. Vert	19	261981.03	560.46	24732.86
	Max. H_x	14	13476.41	2594.66	1237.22
	Max. H_z	2	242558.24	487.26	27794.44
	Min. Vert	10	-208998.31	-448.81	-24346.69
	Min. H_x	24	-99778.73	-2735.32	-17795.27
	Min. H_z	27	-194674.98	-429.00	-28558.45

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	42733.42	0.00	-0.00	16530.35	-14376.04	0.03
Dead+Wind 0 deg - No Ice	42733.42	0.00	-44790.58	-4943138.08	-14487.70	20828.75
Dead+Wind 30 deg - No Ice	42733.42	21717.07	-37615.07	-4185778.49	-2440752.34	29397.46
Dead+Wind 45 deg - No Ice	42733.42	30552.72	-30552.72	-3401976.56	-3433086.39	30997.25
Dead+Wind 60 deg - No Ice	42733.42	37223.50	-21491.00	-2391749.35	-4185907.71	30470.12
Dead+Wind 90 deg - No Ice	42733.42	43434.14	-0.00	16623.51	-4866929.05	24119.24
Dead+Wind 120 deg - No Ice	42733.42	38789.78	22395.29	2496444.70	-4309653.90	11359.48
Dead+Wind 135 deg - No Ice	42733.80	30552.24	30553.20	3435167.98	-3433033.70	2884.77
Dead+Wind 150 deg - No Ice	42733.42	21717.06	37615.07	4218955.47	-2440694.87	-5260.62
Dead+Wind 180 deg - No Ice	42733.42	-0.00	42982.00	4833347.97	-14477.26	-19739.31
Dead+Wind 210 deg - No Ice	42733.42	-21717.07	37615.07	4219014.96	2411762.90	-29397.46
Dead+Wind 225 deg - No Ice	42733.37	-30552.72	30552.72	3435236.34	3404135.15	-30990.69
Dead+Wind 240 deg - No Ice	42733.42	-38789.78	22395.29	2496503.04	4280780.88	-32188.26
Dead+Wind 270 deg - No Ice	42733.42	-43434.14	-0.00	16629.07	4838083.51	-24119.37
Dead+Wind 300 deg - No Ice	42733.42	-37223.50	-21491.00	-2391794.55	4157030.23	-10730.80
Dead+Wind 315 deg - No Ice	42733.42	-30552.72	-30552.72	-3402030.72	3404178.14	-2889.33
Dead+Wind 330 deg - No Ice	42733.42	-21717.07	-37615.06	-4185827.00	2411806.13	5260.75
Dead+Ice+Temp	67371.89	-0.00	-0.00	35607.49	-30656.02	-1.05

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 0 deg+Ice+Temp	67371.89	-0.00	-47687.22	-5185840.99	-30826.34	23423.21
Dead+Wind 30 deg+Ice+Temp	67371.89	21635.67	-37474.09	-4124982.33	-2433019.58	28467.11
Dead+Wind 45 deg+Ice+Temp	67371.89	30077.05	-30077.05	-3312302.14	-3378865.69	28970.87
Dead+Wind 60 deg+Ice+Temp	67371.89	36199.33	-20899.70	-2296913.85	-4071091.90	27507.74
Dead+Wind 90 deg+Ice+Temp	67371.89	43271.34	-0.02	35747.23	-4835138.11	21395.21
Dead+Wind 120 deg+Ice+Temp	67371.89	41298.34	23843.61	2646487.48	-4552733.95	9236.96
Dead+Wind 135 deg+Ice+Temp	67371.89	30077.04	30077.05	3383754.09	-3378801.63	663.87
Dead+Wind 150 deg+Ice+Temp	67371.87	21635.76	37474.02	4196421.09	-2432958.80	-7048.54
Dead+Wind 180 deg+Ice+Temp	67371.89	-0.00	41799.39	4701051.67	-30795.73	-19529.36
Dead+Wind 210 deg+Ice+Temp	67371.89	-21635.67	37474.09	4196475.80	2371387.05	-28467.12
Dead+Wind 225 deg+Ice+Temp	67371.89	-30077.05	30077.05	3383819.81	3317255.75	-28971.65
Dead+Wind 240 deg+Ice+Temp	67371.89	-41298.34	23843.61	2646559.12	4491209.44	-32660.16
Dead+Wind 270 deg+Ice+Temp	67371.89	-43271.35	-0.02	35758.40	4773639.22	-21395.50
Dead+Wind 300 deg+Ice+Temp	67371.89	-36199.33	-20899.70	-2296950.67	4009561.24	-7978.38
Dead+Wind 315 deg+Ice+Temp	67371.89	-30077.05	-30077.05	-3312349.57	3317303.71	-663.75
Dead+Wind 330 deg+Ice+Temp	67371.87	-21635.58	-37474.13	-4125026.26	2371424.94	7048.79
Dead+Wind 0 deg - Service	42733.42	0.00	-17496.32	-1920830.15	-14434.01	8135.18
Dead+Wind 30 deg - Service	42733.45	8483.11	-14693.33	-1624994.51	-962200.42	11484.76
Dead+Wind 45 deg - Service	42733.42	11934.66	-11934.66	-1318822.97	-1349839.31	12109.30
Dead+Wind 60 deg - Service	42733.42	14540.43	-8394.92	-924199.74	-1643918.21	11903.22
Dead+Wind 90 deg - Service	42733.42	16966.46	-0.00	16583.61	-1909954.26	9420.03
Dead+Wind 120 deg - Service	42733.42	15152.26	8748.16	985281.87	-1692266.13	4436.68
Dead+Wind 135 deg - Service	42733.42	11934.66	11934.66	1351983.24	-1349826.99	1128.68
Dead+Wind 150 deg - Service	42733.42	8483.23	14693.39	1658152.17	-962191.01	-2053.41
Dead+Wind 180 deg - Service	42733.42	-0.00	16789.84	1898148.18	-14430.95	-7711.25
Dead+Wind 210 deg - Service	42733.45	-8483.25	14693.26	1658161.15	933332.53	-11484.75
Dead+Wind 225 deg - Service	42733.42	-11934.66	11934.66	1351993.36	1320972.25	-12106.59
Dead+Wind 240 deg - Service	42733.42	-15152.26	8748.16	985291.93	1663416.06	-12571.85
Dead+Wind 270 deg - Service	42733.42	-16966.46	-0.00	16585.77	1881107.50	-9419.98
Dead+Wind 300 deg - Service	42733.42	-14540.43	-8394.92	-924205.52	1615065.81	-4191.94
Dead+Wind 315 deg - Service	42733.42	-11934.66	-11934.66	-1318830.14	1320982.11	-1129.21
Dead+Wind 330 deg - Service	42733.42	-8483.23	-14693.39	-1625001.52	933337.71	2053.33

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-42733.42	-0.00	-0.00	42733.42	0.00	0.000%
2	0.00	-42733.42	-44790.58	-0.00	42733.42	44790.58	0.000%
3	21717.07	-42733.42	-37615.07	-21717.07	42733.42	37615.07	0.000%
4	30552.72	-42733.42	-30552.72	-30552.72	42733.42	30552.72	0.000%
5	37223.50	-42733.42	-21491.00	-37223.50	42733.42	21491.00	0.000%
6	43434.14	-42733.42	-0.00	-43434.14	42733.42	0.00	0.000%
7	38789.78	-42733.42	22395.29	-38789.78	42733.42	-22395.29	0.000%
8	30552.72	-42733.42	30552.72	-30552.24	42733.80	-30553.20	0.001%
9	21717.07	-42733.42	37615.07	-21717.06	42733.42	-37615.07	0.000%
10	0.00	-42733.42	42982.00	0.00	42733.42	-42982.00	0.000%
11	-21717.07	-42733.42	37615.07	21717.07	42733.42	-37615.07	0.000%
12	-30552.72	-42733.42	30552.72	30552.72	42733.37	-30552.72	0.000%
13	-38789.78	-42733.42	22395.29	38789.78	42733.42	-22395.29	0.000%
14	-43434.14	-42733.42	-0.00	43434.14	42733.42	0.00	0.000%
15	-37223.50	-42733.42	-21491.00	37223.50	42733.42	21491.00	0.000%
16	-30552.72	-42733.42	-30552.72	30552.72	42733.42	30552.72	0.000%
17	-21717.07	-42733.42	-37615.07	21717.07	42733.42	37615.06	0.000%
18	0.00	-67371.89	-0.00	0.00	67371.89	0.00	0.000%
19	0.00	-67371.89	-47687.25	0.00	67371.89	47687.22	0.000%
20	21635.69	-67371.89	-37474.11	-21635.67	67371.89	37474.09	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
21	30077.06	-67371.89	-30077.06	-30077.05	67371.89	30077.05	0.000%
22	36199.35	-67371.89	-20899.71	-36199.33	67371.89	20899.70	0.000%
23	43271.37	-67371.89	-0.00	-43271.34	67371.89	0.02	0.000%
24	41298.37	-67371.89	23843.62	-41298.34	67371.89	-23843.61	0.000%
25	30077.06	-67371.89	30077.06	-30077.04	67371.89	-30077.05	0.000%
26	21635.69	-67371.89	37474.11	-21635.76	67371.87	-37474.02	0.000%
27	-0.00	-67371.89	41799.41	0.00	67371.89	-41799.39	0.000%
28	-21635.69	-67371.89	37474.11	21635.67	67371.89	-37474.09	0.000%
29	-30077.06	-67371.89	30077.06	30077.05	67371.89	-30077.05	0.000%
30	-41298.37	-67371.89	23843.62	41298.34	67371.89	-23843.61	0.000%
31	-43271.37	-67371.89	-0.00	43271.35	67371.89	0.02	0.000%
32	-36199.35	-67371.89	-20899.71	36199.33	67371.89	20899.70	0.000%
33	-30077.06	-67371.89	-30077.06	30077.05	67371.89	30077.05	0.000%
34	-21635.69	-67371.89	-37474.11	21635.58	67371.87	37474.13	0.000%
35	0.00	-42733.42	-17496.32	-0.00	42733.42	17496.32	0.000%
36	8483.23	-42733.42	-14693.39	-8483.11	42733.45	14693.33	0.000%
37	11934.66	-42733.42	-11934.66	-11934.66	42733.42	11934.66	0.000%
38	14540.43	-42733.42	-8394.92	-14540.43	42733.42	8394.92	0.000%
39	16966.46	-42733.42	-0.00	-16966.46	42733.42	0.00	0.000%
40	15152.26	-42733.42	8748.16	-15152.26	42733.42	-8748.16	0.000%
41	11934.66	-42733.42	11934.66	-11934.66	42733.42	-11934.66	0.000%
42	8483.23	-42733.42	14693.39	-8483.23	42733.42	-14693.39	0.000%
43	-0.00	-42733.42	16789.84	0.00	42733.42	-16789.84	0.000%
44	-8483.23	-42733.42	14693.39	8483.25	42733.45	-14693.26	0.000%
45	-11934.66	-42733.42	11934.66	11934.66	42733.42	-11934.66	0.000%
46	-15152.26	-42733.42	8748.16	15152.26	42733.42	-8748.16	0.000%
47	-16966.46	-42733.42	-0.00	16966.46	42733.42	0.00	0.000%
48	-14540.43	-42733.42	-8394.92	14540.43	42733.42	8394.92	0.000%
49	-11934.66	-42733.42	-11934.66	11934.66	42733.42	11934.66	0.000%
50	-8483.23	-42733.42	-14693.39	8483.23	42733.42	14693.39	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000105
9	Yes	4	0.00000001	0.00000133
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000134
18	Yes	4	0.00000001	0.00003515
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001

22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000270
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000292
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	192 - 180	5.366	40	0.2526	0.0250
T2	180 - 160	4.728	40	0.2500	0.0253
T3	160 - 140	3.697	40	0.2226	0.0227
T4	140 - 120	2.806	40	0.1887	0.0188
T5	120 - 100	2.046	40	0.1558	0.0145
T6	100 - 80	1.419	40	0.1269	0.0112
T7	80 - 60	0.920	40	0.0971	0.0084
T8	60 - 40	0.539	40	0.0717	0.0060
T9	40 - 20	0.260	40	0.0487	0.0039
T10	20 - 0	0.078	40	0.0247	0.0018

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
192.00	(2) DB980H90T2E-M	40	5.366	0.2526	0.0250	Inf
190.00	T-Frame	40	5.260	0.2526	0.0251	Inf
180.00	APL869012-42T0	40	4.728	0.2500	0.0253	526133
170.00	(3) ALP 9212-N	40	4.201	0.2390	0.0244	52403
160.00	7250.03 w/Mount Pipe	40	3.697	0.2226	0.0227	28016

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	(2) 79210	40	3.233	0.2056	0.0208	32192
140.00	(3) DUO1417-8686	40	2.806	0.1887	0.0188	39924
110.00	Catrain 738449	40	1.716	0.1412	0.0127	36113
108.00	3' Sidearm	40	1.654	0.1383	0.0124	36330

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	192 - 180	14.209	24	0.6628	0.0642
T2	180 - 160	12.537	24	0.6563	0.0648
T3	160 - 140	9.829	24	0.5863	0.0581
T4	140 - 120	7.481	24	0.4986	0.0481
T5	120 - 100	5.471	24	0.4132	0.0378
T6	100 - 80	3.803	24	0.3376	0.0291
T7	80 - 60	2.471	24	0.2592	0.0221
T8	60 - 40	1.450	24	0.1918	0.0156
T9	40 - 20	0.703	24	0.1304	0.0102
T10	20 - 0	0.211	24	0.0664	0.0046

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
192.00	(2) DB980H90T2E-M	24	14.209	0.6628	0.0642	Inf
190.00	T-Frame	24	13.931	0.6628	0.0644	Inf
180.00	APL869012-42T0	24	12.537	0.6563	0.0648	193617
170.00	(3) ALP 9212-N	24	11.154	0.6282	0.0624	20603
160.00	7250.03 w/Mount Pipe	24	9.829	0.5863	0.0581	10994
150.00	(2) 79210	24	8.607	0.5424	0.0533	12525
140.00	(3) DUO1417-8686	24	7.481	0.4986	0.0481	15349
110.00	Catrain 738449	24	4.593	0.3751	0.0333	13897
108.00	3' Sidearm	24	4.428	0.3677	0.0324	13951

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	192	Leg	A325N	0.6250	4	47.15	13497.70	0.003 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	1263.92	6442.72	0.196 ✓	1.333	Bolt Shear
T2	180	Leg	A325N	0.6250	4	1437.09	13491.00	0.107 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	3733.33	6442.72	0.579 ✓	1.333	Bolt Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T3	160	Leg	A325N	0.8750	4	6746.59	26458.00	0.255 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	5088.19	6442.72	0.790 ✓	1.333	Bolt Shear
T4	140	Leg	A325N	1.0000	4	12967.20	34554.20	0.375 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	6040.61	6442.72	0.938 ✓	1.333	Bolt Shear
T5	120	Leg	A325N	1.0000	6	13102.50	34557.50	0.379 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	6441.54	9277.52	0.694 ✓	1.333	Bolt Shear
T6	100	Leg	A325N	1.0000	6	17609.00	34557.50	0.510 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	7597.55	9277.52	0.819 ✓	1.333	Bolt Shear
T7	80	Leg	A325N	1.0000	8	16170.80	34557.50	0.468 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	7776.11	9277.52	0.838 ✓	1.333	Bolt Shear
T8	60	Leg	A325N	1.0000	8	18905.60	34557.50	0.547 ✓	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	9060.49	13253.60	0.684 ✓	1.333	Bolt Shear
T9	40	Leg	A325N	1.0000	8	21633.60	34557.50	0.626 ✓	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	10552.30	13253.60	0.796 ✓	1.333	Bolt Shear
T10	20	Leg	A325N	1.0000	10	19428.70	34557.50	0.562 ✓	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	12504.50	13253.60	0.943 ✓	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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	192 - 180	ROHN 2.5 STD	12.00	4.00	50.7 K=1.00	24.247	1.7040	-4446.51	41317.80	0.108 ✓
T2	180 - 160	ROHN 2.5 STD	20.03	5.01	63.4 K=1.00	22.122	1.7040	-26847.70	37696.50	0.712 ✓
T3	160 - 140	ROHN 3 EH	20.04	6.68	70.5 K=1.00	20.840	3.0159	-52882.90	62851.50	0.841 ✓
T4	140 - 120	ROHN 4 EH	20.04	6.68	54.3 K=1.00	23.671	4.4074	-85307.00	104328.00	0.818 ✓
T5	120 - 100	ROHN 5 EH	20.03	6.68	43.6 K=1.00	25.320	6.1120	-116336.00	154757.00	0.752 ✓
T6	100 - 80	ROHN 6 EHS	20.03	10.02	54.0 K=1.00	23.713	6.7133	-143956.00	159191.00	0.904 ✓
T7	80 - 60	ROHN 6 EH	20.04	10.02	54.8 K=1.00	23.589	8.4049	-173021.00	198263.00	0.873 ✓
T8	60 - 40	ROHN 8 EHS	20.03	10.02	41.2 K=1.00	25.667	9.7193	-202315.00	249468.00	0.811 ✓
T9	40 - 20	ROHN 8 EHS	20.03	10.02	41.2 K=1.00	25.667	9.7193	-232112.00	249468.00	0.930 ✓

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T10	20 - 0	ROHN 8 EHS	20.03	10.02	41.2 K=1.00	25.667	9.7193	-261140.00	249468.00	1.047

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	192 - 180	L1 3/4x1 3/4x3/16	7.76	3.57	124.9 K=1.00	9.575	0.6211	-1263.92	5946.71	0.213
T2	180 - 160	L2x2x3/16	9.81	4.75	144.5 K=1.00	7.148	0.7150	-3712.37	5110.87	0.726
T3	160 - 140	L2 1/2x2 1/2x1/4	12.37	6.05	147.8 K=1.00	6.833	1.1900	-5088.19	8131.28	0.626
T4	140 - 120	L2 1/2x2 1/2x1/4	14.15	6.89	168.5 K=1.00	5.261	1.1900	-6040.46	6260.15	0.965
T5	120 - 100	L3x3x1/4	15.97	7.75	157.1 K=1.00	6.051	1.4400	-6441.54	8714.05	0.739
T6	100 - 80	L3 1/2x3 1/2x1/4	19.17	9.39	162.3 K=1.00	5.669	1.6900	-7597.55	9579.92	0.793
T7	80 - 60	L4x4x1/4	21.00	10.32	155.8 K=1.00	6.149	1.9400	-7671.11	11928.30	0.643
T8	60 - 40	L4x4x5/16	22.81	11.12	168.7 K=1.00	5.250	2.4000	-8620.35	12600.00	0.684
T9	40 - 20	L4x4x5/16	23.71	11.57	175.6 K=1.00	4.845	2.4000	-9901.74	11627.60	0.852
T10	20 - 0	L4x4x3/8	25.54	12.49	190.2 K=1.00	4.130	2.8600	-11835.80	11810.50	1.002

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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	192 - 180	L1 3/4x1 3/4x3/16	6.65	6.41	183.9 K=0.82	4.413	0.6211	-106.27	2741.10	0.039

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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	192 - 180	ROHN 2.5 STD	12.00	4.00	50.7	30.000	1.7040	2693.65	51121.50	0.053 ✓
T2	180 - 160	ROHN 2.5 STD	20.03	5.01	63.4	30.000	1.7040	20575.60	51121.50	0.402 ✓
T3	160 - 140	ROHN 3 EH	20.04	6.68	70.5	30.000	3.0159	42839.40	90477.90	0.473 ✓
T4	140 - 120	ROHN 4 EH	20.04	6.68	54.3	30.000	4.4074	69815.50	132223.00	0.528 ✓
T5	120 - 100	ROHN 5 EH	20.03	6.68	43.6	30.000	6.1120	95530.80	183359.00	0.521 ✓
T6	100 - 80	ROHN 6 EHS	20.03	10.02	54.0	30.000	6.7133	117859.00	201398.00	0.585 ✓
T7	80 - 60	ROHN 6 EH	20.04	10.02	54.8	30.000	8.4049	140345.00	252148.00	0.557 ✓
T8	60 - 40	ROHN 8 EHS	20.03	10.02	41.2	30.000	9.7193	162130.00	291579.00	0.556 ✓
T9	40 - 20	ROHN 8 EHS	20.03	10.02	41.2	30.000	9.7193	183579.00	291579.00	0.630 ✓
T10	20 - 0	ROHN 8 EHS	20.03	10.02	41.2	30.000	9.7193	204018.00	291579.00	0.700 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	192 - 180	L1 3/4x1 3/4x3/16	7.76	3.57	83.6	29.000	0.3604	1184.02	10450.20	0.113 ✓
T2	180 - 160	L2x2x3/16	9.81	4.75	95.5	29.000	0.4308	3733.33	12492.70	0.299 ✓
T3	160 - 140	L2 1/2x2 1/2x1/4	12.37	6.05	97.0	29.000	0.7519	5001.93	21804.40	0.229 ✓
T4	140 - 120	L2 1/2x2 1/2x1/4	13.55	6.59	105.5	29.000	0.7519	5994.77	21804.40	0.275 ✓
T5	120 - 100	L3x3x1/4	15.97	7.75	102.1	32.500	0.9159	6394.84	29768.00	0.215 ✓
T6	100 - 80	L3 1/2x3 1/2x1/4	19.17	9.39	105.2	32.500	1.1034	7513.51	35861.70	0.210 ✓
T7	80 - 60	L4x4x1/4	21.00	10.32	100.7	32.500	1.2909	7770.39	41955.50	0.185 ✓
T8	60 - 40	L4x4x5/16	22.81	11.12	109.2	32.500	1.5949	9060.49	51835.00	0.175 ✓
T9	40 - 20	L4x4x5/16	24.62	12.03	118.0	32.500	1.5949	10552.30	51835.00	0.204 ✓
T10	20 - 0	L4x4x3/8	26.46	12.95	127.9	32.500	1.8989	12504.50	61714.50	0.203 ✓

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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	192 - 180	L1 3/4x1 3/4x3/16	6.65	6.41	143.3	21.600	0.6211	117.95	13415.60	0.009

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	192 - 180	Leg	ROHN 2.5 STD	3	-4446.51	55076.63	8.1	Pass
T2	180 - 160	Leg	ROHN 2.5 STD	26	-26847.70	50249.43	53.4	Pass
T3	160 - 140	Leg	ROHN 3 EH	53	-52882.90	83781.05	63.1	Pass
T4	140 - 120	Leg	ROHN 4 EH	74	-85307.00	139069.22	61.3	Pass
T5	120 - 100	Leg	ROHN 5 EH	95	-116336.00	206291.07	56.4	Pass
T6	100 - 80	Leg	ROHN 6 EHS	116	-143956.00	212201.59	67.8	Pass
T7	80 - 60	Leg	ROHN 6 EH	131	-173021.00	264284.57	65.5	Pass
T8	60 - 40	Leg	ROHN 8 EHS	146	-202315.00	332540.83	60.8	Pass
T9	40 - 20	Leg	ROHN 8 EHS	161	-232112.00	332540.83	69.8	Pass
T10	20 - 0	Leg	ROHN 8 EHS	176	-261140.00	332540.83	78.5	Pass
T1	192 - 180	Diagonal	L1 3/4x1 3/4x3/16	12	-1263.92	7926.96	15.9	Pass
T2	180 - 160	Diagonal	L2x2x3/16	31	-3712.37	6812.79	54.5	Pass
T3	160 - 140	Diagonal	L2 1/2x2 1/2x1/4	58	-5088.19	10839.00	46.9 59.2 (b)	Pass
T4	140 - 120	Diagonal	L2 1/2x2 1/2x1/4	79	-6040.46	8344.78	72.4	Pass
T5	120 - 100	Diagonal	L3x3x1/4	97	-6441.54	11615.83	55.5	Pass
T6	100 - 80	Diagonal	L3 1/2x3 1/2x1/4	118	-7597.55	12770.03	59.5 61.4 (b)	Pass
T7	80 - 60	Diagonal	L4x4x1/4	133	-7671.11	15900.42	48.2 62.9 (b)	Pass
T8	60 - 40	Diagonal	L4x4x5/16	148	-8620.35	16795.80	51.3	Pass
T9	40 - 20	Diagonal	L4x4x5/16	169	-9901.74	15499.59	63.9	Pass
T10	20 - 0	Diagonal	L4x4x3/8	184	-11835.80	15743.40	75.2	Pass
T1	192 - 180	Top Girt	L1 3/4x1 3/4x3/16	4	-106.27	3653.89	2.9	Pass
							Summary	
						Leg (T10)	78.5	Pass
						Diagonal (T10)	75.2	Pass
						Top Girt (T1)	2.9	Pass
						Bolt Checks	70.8	Pass
						RATING =	**78.5**	**Pass**

ANCHOR BOLT ANALYSIS

URS

Job	192' Rohn SSV - Ashford, CT	Project No.	VZ1-200	Page	of
Description	Anchor Bolt Analysis	Computed by	JEK	Sheet 1	of 3
	Janoski Road	Checked by		Date 08/01/06	
				Date	

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	Uplift := 209·kips	*user input*	
Shear:	Shear := 29·kips	*user input*	
Compression:	Compression := 266·kips	*user input*	

Anchor Bolt Data:

Use ASTM A354 Grade BC

Number of Anchor Bolts = N	N := 10	*user input*	
Bolt Ultimate Strength:	F_u := 125·ksi	*user input*	
Bolt Yield Strength:	Fy := 109·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:

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

Net Area of Bolt:

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

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$AllowableTension := 1.33\cdot(0.33\cdot A_g\cdot F_u) \qquad AllowableTension = 43.1\,kips$$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{net.area} := 1.33\cdot(0.60\cdot A_n\cdot Fy) \qquad F_{net.area} = 52.7\,kips$$

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 20.9\,kips$$

Check Stresses:

$$\frac{MaxTension}{AllowableTension} = 0.49$$

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

Condition1 = "OK"

URS

Job	192' Rohn SSV - Ashford, CT	Project No.	VZ1-200	Page	of
Description	Anchor Bolt Analysis	Computed by	JEK	Sheet	3 of 3
	Janoski Road	Checked by		Date	08/01/06

Check Anchor Bolt Area:

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

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 2.5\ in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 1.0\ in^2$$

Provided Area:

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

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.4$$

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

URS

				Page	of
Job	192' Rohn SSV - Ashford, CT	Project No.	VZ1-200	Sheet 1	of 2
Description	Foundation Analysis	Computed by	JEK	Date	08/01/06
	Janoski Road	Checked by		Date	

3 SIDED SELF SUPPORTING TOWER FOUNDATION DRILLED PIER

Compression:	DownLoad := 266·kips	γc := 150pcf	Concrete unit weight
Uplift:	uplift := 209·kips	γw := 62.4pcf	Water unit weight
Depth Neglected for Skin Friction at the top	Depthunbond := 4·ft	γs := 120pcf	Soil unit weight
Drill Caisson length	CasissonLength := 26.5·ft	Pierϕ := 5·ft	Pier diameter
Water Table Below grade:	Wd := 19·ft	hg := 0.5·ft	Height of Pier Above grade
Ave allowable Shear at Depth of 4' to 19'	f1 := 1050psf	SoilBearingCapaciy := 10ksf	
Ave allowable Shear at Depth of 19' to 26'	f2 := 1500psf		

Loading:

$$TotalDownLoad := DownLoad + \pi \cdot \frac{Pier\phi^2}{4} \cdot \left[hg \cdot \gamma c + \left[(\gamma c - \gamma s) \cdot (CasissonLength - hg) \right] \right] \ *$$

$$TotalDownLoad = 282.79\,kips$$

$$Pierweight := \pi \cdot \frac{Pier\phi^2}{4} \cdot \left[(Wd + hg) \cdot \gamma c + (CasissonLength - Wd - hg) \cdot (\gamma c - \gamma w) \right] \ *$$

$$Pierweight = 69.47\,kips$$

$$Soilshear := \pi \cdot Pier\phi \cdot [f1 \cdot (Wd - Depthunbond) + f2 \cdot (CasissonLength - Wd - hg)] \ *$$

$$Soilshear = 412.33\,kips$$

Compression Capacity:

$$TotalDownLoadCapacity := Soilshear + SoilBearingCapaciy \cdot \left(\pi \cdot \frac{Pier\phi^2}{4} \right) \ *$$

$$TotalDownLoadCapacity = 608.68\,kips$$

$$CheckDownLoadCapacity := if(TotalDownLoad < TotalDownLoadCapacity, "Okay", "No Good")$$

$$CheckDownLoadCapacity = "Okay"$$

URS

Job	192' Rohn SSV - Ashford, CT	Project No.	VZ1-200	Page	of
Description	Foundation Analysis	Computed by	JEK	Sheet 2	of 2
	Janoski Road	Checked by		Date 08/01/06	

Tension Capacity:

$TotalUpLiftCapacity := Soilshear + Pierweight$

$TotalUpLiftCapacity = 481.81\,kips$

$CkeckUpLiftCapacity := if(2uplift < TotalUpLiftCapacity, "Okay", "No Good")$

$CkeckUpLiftCapacity = "Okay"$

$SafetyFactor_{provided} := \frac{TotalUpLiftCapacity}{uplift}$ $\quad SafetyFactor_{provided} = 2.31$

Check Cone Failure

$ConeFailureCapacity := \frac{\left[(CasissonLength - hg)\cdot\tan(30\cdot deg)\cdot 2 + Pier\phi\right]^2\cdot\pi}{4}\cdot\frac{CasissonLength - hg}{3}\cdot\gamma s$ *

$ConeFailureCapacity = 1001.87\,kips$

$CheckConeFailureCapacity := if(uplift < ConeFailureCapacity, "Okay", "No Good")$

$CkeckUpLiftCapacity = "Okay"$

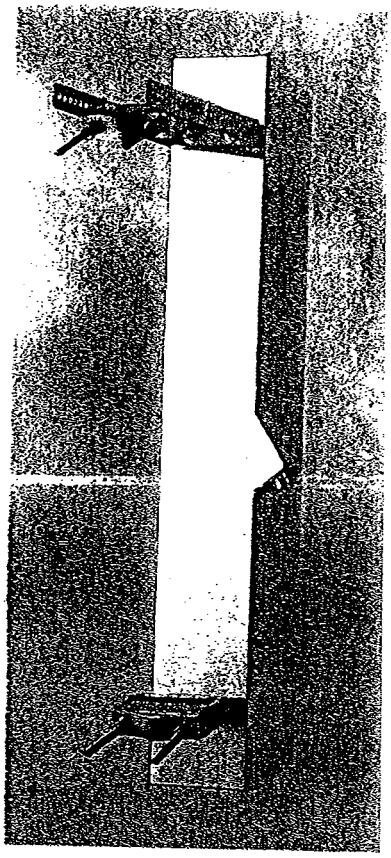
$ConeSafetyFactor_{provided} := \frac{ConeFailureCapacity}{uplift}$ $\quad ConeSafetyFactor_{provided} = 4.79$

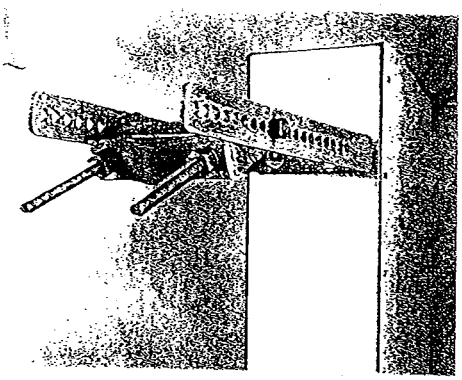
ALP-E 9011-Din

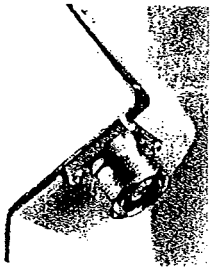
Enhanced Log-Periodic Antenna

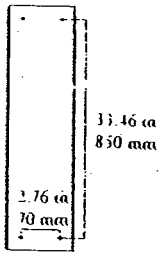
Features:

- ❑ Small Size
- ❑ Aesthetically Pleasing
- ❑ Suitable For TDMA/CDMA
- ❑ High Return Loss
- ❑ Low Intermodulation
- ❑ High FTB
- ❑ Broadbanded
- ❑ Side-lobe Suppression
- ❑ Sturdy Design
- ❑ Down-Tilt Brackets Incl.









The distance between the center of the bolts (on the back of the antenna) are shown in the drawing above.

Bolt diameter is: 3/8-16 (comes with lock nut).

Frequency Range:	800-900 MHz
Impedance:	50 ohm
Connector Type:	7/16 Din
Return Loss:	20 dB
Polarization:	Vertical
Gain:	> 11 dBd
Front To Back Ratio:	> 30 dB
Side-Lobe Suppression:	18 dB
Intermodulation (2x25W):	IM3 > 146 dB
	IM5 > 153 dB
	IM7/9 > 163 dB
Power Rating:	500 W
H-Plane (-3 dB point):	85 - 92°
V-Plane (-3 dB point):	16 - 18°
Lightning Protection:	DC Grounded

Overall Height:	43 in	[1092 mm]
Width:	6.5 in	[165 mm]
Depth:	8 in	[203 mm]
Weight Including Tilt-Brackets:	20 lbs	[9.1 Kg]
Rated Wind Velocity:	113 mph	[180 Km/h]
Wind Area (CxA/Side):	2.3 sq. ft.	[0.22 sq.m]
Lateral Thrust At Rated Wind Worst Case:	112 lbs	[500 N]

Radiating Elements:	Aluminum
Extrusion:	Aluminum
Radome:	Grey PVC
Tilt-Bracket:	Hot Dip Galvanized Steel
Antenna Bolts:	Stainless Steel

The ALP-E 9011-Din is made in U.S.A.

Vertically Polarized, Panel 90° / 11.5 dBd

WPA-80090/4CF ____

When ordering, replace "___" with connector type.

Mechanical specifications

Length	1205 mm	47.4 in
Width	205 mm	8.1 in
Depth	145 mm	5.7 in
[4] Weight	5.4 kg	12.0 lbs
Wind Area		
Front	0.25 m^2	2.66 ft^2
Side	0.17 m^2	1.88 ft^2
Rated Wind Velocity (Safety factor 2.0)		
	>679 km/hr	>422 mph
Wind load @ 100 mph (161 km/hr)		
Front	362 N	81.4 lbs
Side	264 N	59.4 lbs

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

Mounting & Downtilting:

Mounting brackets attach to a pipe diameter of Ø50-127 mm (2.0-5.0 in)

Mounting bracket kit #36210002

Downtilt bracket kit #36114003

Electrical specifications

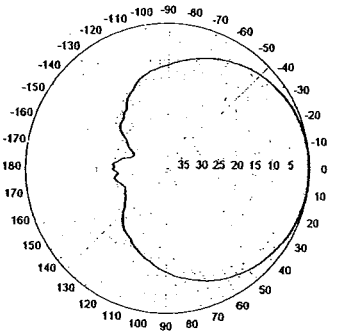
Frequency Range	806-960 MHz
Impedance	50Ω
[3] Connector	NE, E-DIN
[1] VSWR	<1.4:1
Polarization	Vertical
[1] Gain	11.5 dBd
[2] Power Rating	500 W
[1] Half Power Angle	
H-Plane	90°
E-Plane	15°
[1] Electrical Downtilt	0°
[1] Null Fill	10%
Lightning Protection	Direct Ground

Patented Dipole Design: U.S. Patent No. 6,229,496 B1

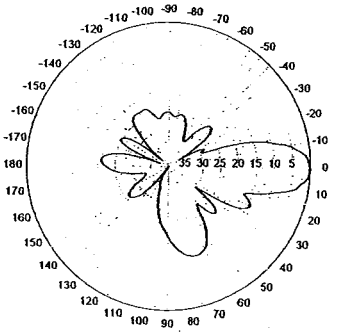
[1] Typical Values
[2] Power Rating limited by connector only
[3] NE indicates an elongated N Connector.
E-DIN indicates an elongated DIN Connector.
[4] The antenna weight listed above does not include the bracket weight.

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

Radiation-pattern[1]



Horizontal



Vertical

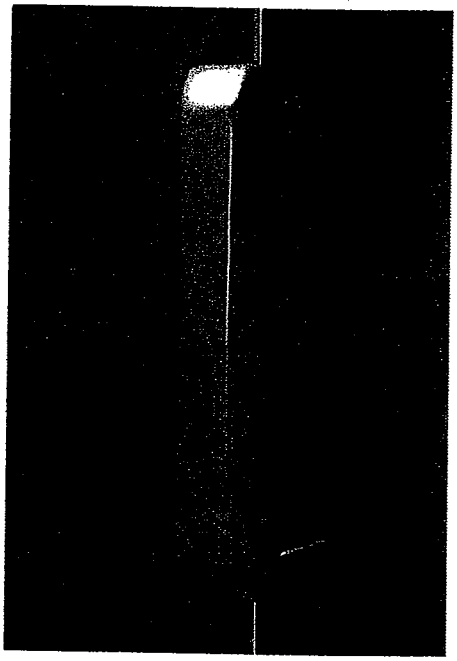
Featuring upper side lobe suppression.

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

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

CF Denotes a Center-Fed Connector.

806-960 MHz



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

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

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

Antenna available with center-fed connector only.

1300 Capital Drive Rockford, IL 61109 Toll-Free (888) 417-9562 Tel. (815) 399-0001
Fax (815) 399-0156 Email: antel@antelinc.com www.antelinc.com

Amphenol Antel, Inc.
The Antenna Technology Company

Revision Date: 6/3/04

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF 180' SELF-SUPPORTING LATTICE TOWER FOR NEW ANTENNA ARRANGEMENT

101 Burbank Road
Ellington, 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

36931026.00008
VZ1-201

July 31, 2006

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 180' self supporting lattice tower located at 101 Burbank Road in Ellington, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code and the TIA/EIA-222-F standard for wind velocity of 80 mph and 69 mph concurrent with ½" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report. The proposed Verizon modification is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove: **(6) existing Swedcom ALP-E-9011 antennas** **Install:** **(6) Antel WPA-80090/4 antennas on the existing T-Booms with (6) existing 1 5/8" coax cables**	**Verizon (Proposed)**	**@ 176'-6"**

The results of the analysis indicate that the tower structure, anchor bolts, and foundation are in compliance with the proposed loading conditions. **The tower is considered structurally adequate with the wind load classification specified above and all the existing and 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 taken from a tower report prepared by Rohn Industries, Inc, engineering file number 42895AE, dated April 3, 2000.
3) Antenna and mount configuration as specified on the following page of this report.

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

If you should have any questions, please call.

Sincerely,

URS Corporation

Richard A. Sambor, P.E.
Manager Facilities Design

RAS/jek

cc: AA, DR, IA, CF/Book – URS

2. INTRODUCTION

The subject tower is located at 101 Burbank Road in Ellington, Connecticut. The structure is a 180' self-supporting lattice tower designed and manufactured Rohn Industries, Inc.

The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(1) DB222 antenna	NESM (existing)	Directly mounted	196'-6"	(1) 1 1/4" coax cable
(1) PD220 antenna	NESM (existing)	Directly mounted	191'-6"	(1) 1 1/4" coax cable
(9) EMS RR90-1702 antennas	T-Mobile (existing)	(3) T-Booms	186'-6"	(6)1 5/8" coax cables
(6) existing Decibel DB948F85T2E-M antennas **(6) Antel WPA-80090/4 antennas**	**Verizon (proposed)**	**(3) existing T-Booms**	**176'-6"**	**(12) 1 5/8" coax cables**
(6) Allgon 7250.03 antennas	Cingular Blue (existing)	(3) T-Arms	166'-6"	(6) dead 1 5/8" coax cables
(12) CSS DUO1417-8686 antennas (6) TMAs	Cingular (existing)	(3) T-Booms	156'-6"	(9) 1 5/8" coax cables
(1) GPS antenna	(existing)	Stand-Off	76'-6"	(1) 1/2" coax cable
(1) GPS antenna	(existing)	Stand-Off	36'-6"'	(1) 1/2" coax cable

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 existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with the 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 analysis was conducted using RISA Tower 4.5. 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 Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 69 mph Wind Load (with ice) + Ice Load + Tower Dead Load

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

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

4. FINDINGS AND EVALUATION

Stresses on the tower structure were evaluated to compare with allowable stresses in accordance with AISC. The calculated stresses under the proposed loading were within the allowable stresses. Detailed analysis and calculations for the proposed load condition are provided in section 6 of this report. The anchor bolts and foundation were also found to be within the allowable limits.

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis indicate that the tower structure, anchor bolts, and foundation are in compliance with the proposed loading conditions. **The tower is structurally adequate under the wind load classification specified above and the proposed antenna loadings.**

Limitations/Assumptions:

This report is based on the following:

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

URS is not responsible for any 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.

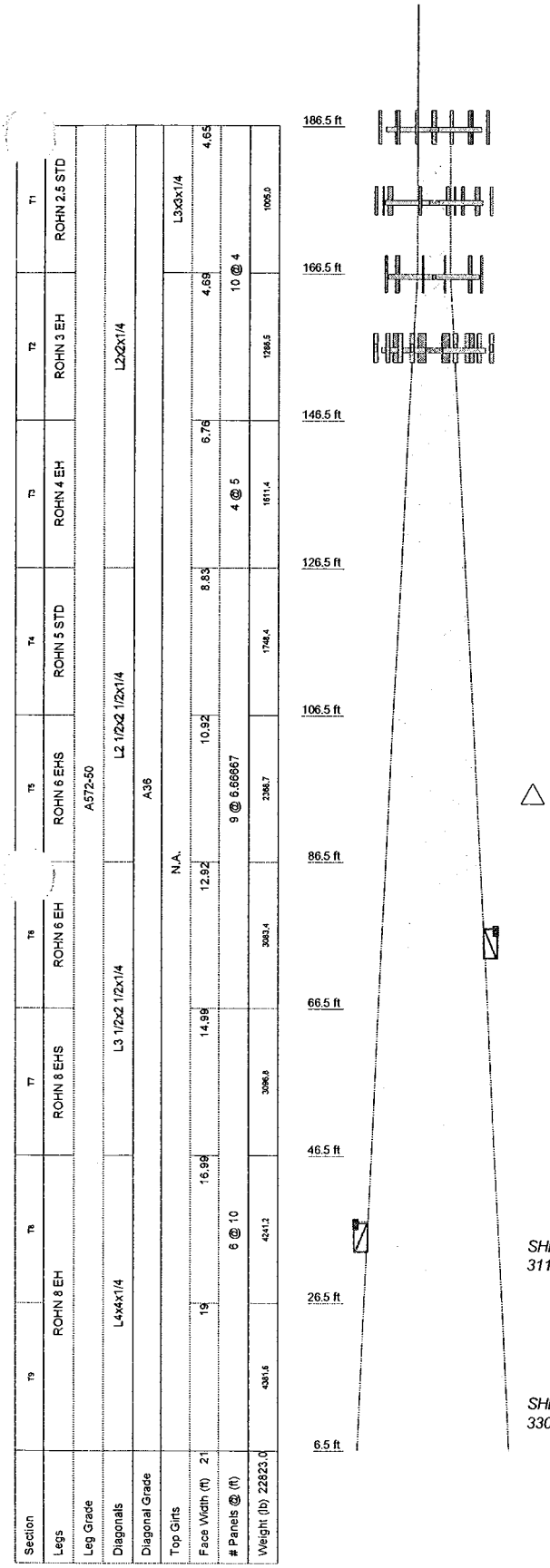
Ongoing and Periodic Inspection and Maintenance:

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

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

6. DRAWINGS AND DATA

RISA TOWER INPUT/OUTPUT SUMMARY



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DB222 (NESM)	196.5	T-Frame (Verizon)	176.5
PD220 (NESM)	192.25	T-Frame (Verizon)	176.5
(3) RR90-17-02DP (T-Mobile)	186.5	(2) 7250.03 (Cingular Blue)	166.5
(3) RR90-17-02DP (T-Mobile)	186.5	(2) 7250.03 (Cingular Blue)	166.5
(3) RR90-17-02DP (T-Mobile)	186.5	(2) 7250.03 (Cingular Blue)	166.5
T-Frame (T-Mobile)	186.5	T-Arm (Cingular Blue)	166.5
T-Frame (T-Mobile)	186.5	T-Arm (Cingular Blue)	166.5
T-Frame (T-Mobile)	186.5	T-Arm (Cingular Blue)	166.5
WPA-80090/4CF (Verizon)	176.5	(4) DUO1417-8686 (Cingular)	156.5
DB948F85T2E-M (Verizon)	176.5	(4) DUO1417-8686 (Cingular)	156.5
WPA-80090/4CF (Verizon)	176.5	(4) DUO1417-8686 (Cingular)	156.5
DB948F85T2E-M (Verizon)	176.5	T-Frame (Cingular)	156.5
WPA-80090/4CF (Verizon)	176.5	T-Frame (Cingular)	156.5
DB948F85T2E-M (Verizon)	176.5	T-Frame (Cingular)	156.5
WPA-80090/4CF (Verizon)	176.5	(2) Generic TMA (Cingular)	156.5
DB948F85T2E-M (Verizon)	176.5	(2) Generic TMA (Cingular)	156.5
WPA-80090/4CF (Verizon)	176.5	(2) Generic TMA (Cingular)	156.5
DB948F85T2E-M (Verizon)	176.5	GPS	76.5
WPA-80090/4CF (Verizon)	176.5	2' Sidearm	75.5
DB948F85T2E-M (Verizon)	176.5	GPS	36.5
T-Frame (Verizon)	176.5	2' Sidearm	35.5

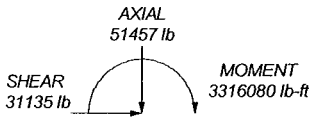
MATERIAL STRENGTH

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

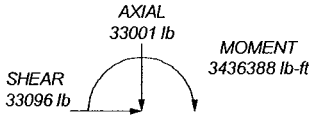
TOWER DESIGN NOTES

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 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 83.2%

MAX PIER FORCES:
DOWN: 199953 lb
UPLIFT: -172155 lb
SHEAR: 21187 lb



TORQUE 10835 lb-ft
69 mph WIND - 0.5000 in ICE



TORQUE 10131 lb-ft
REACTIONS - 80 mph WIND

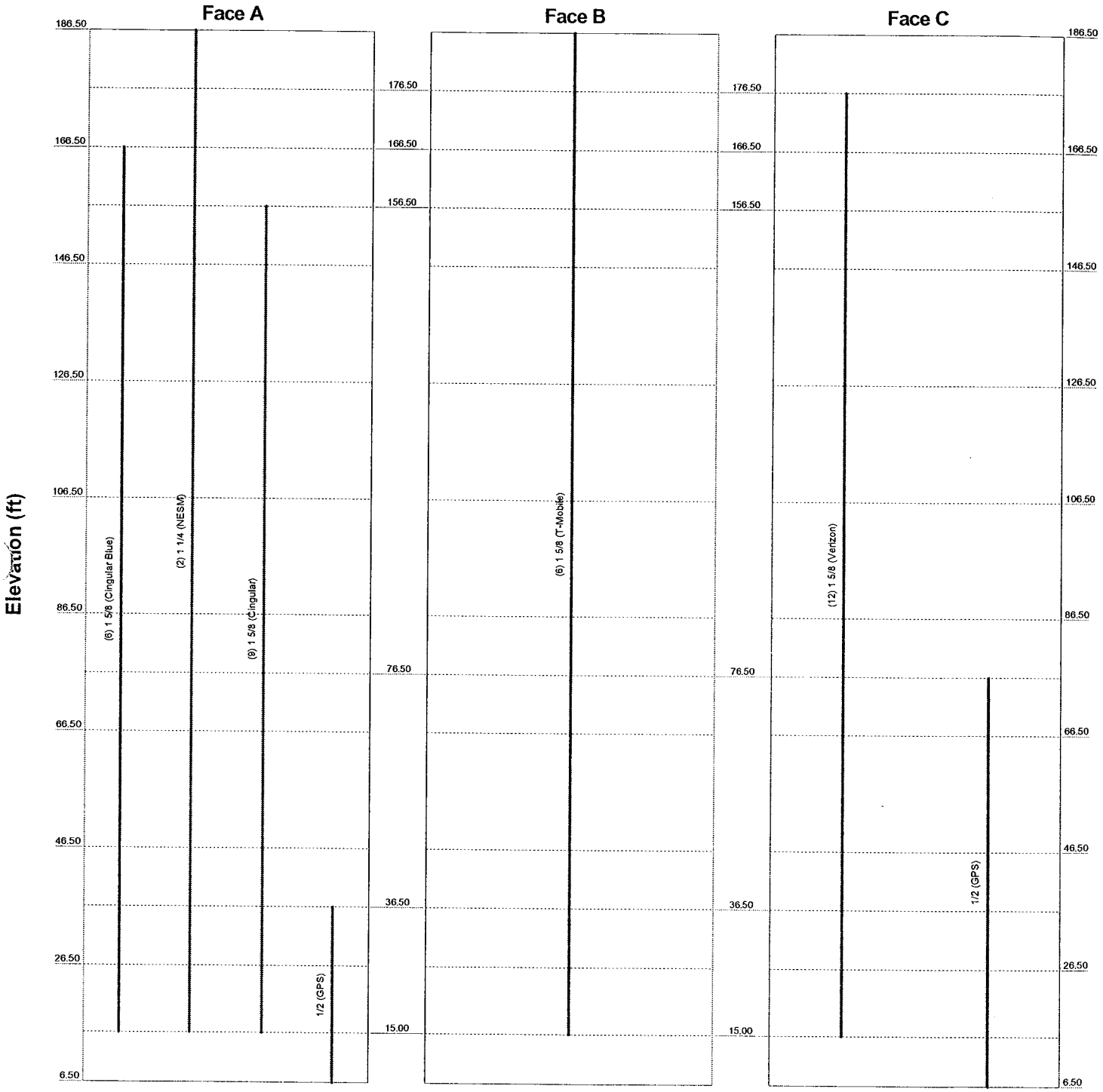
URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: (850) 529-8882
FAX: (860) 529-3991

Job: *180' Self Supporter*			
Project: *101 Burbank Road Ellington, CT*			
Client: Verizon Wireless	Drawn by: Craig Thomas		App'd:
Code: TIA/EIA-222-F	Date: 07/31/06		Scale: NTS
Path: P:\08\ERIFiles\180' Self-Supporting Lattice Tower.eri			Dwg No. E-1

RISA TOWER FEEDLINE DISTRIBUTION

Feedline Distribution Chart
6'6" - 186'6"

Round Flat App In Face App Out Face Truss Leg



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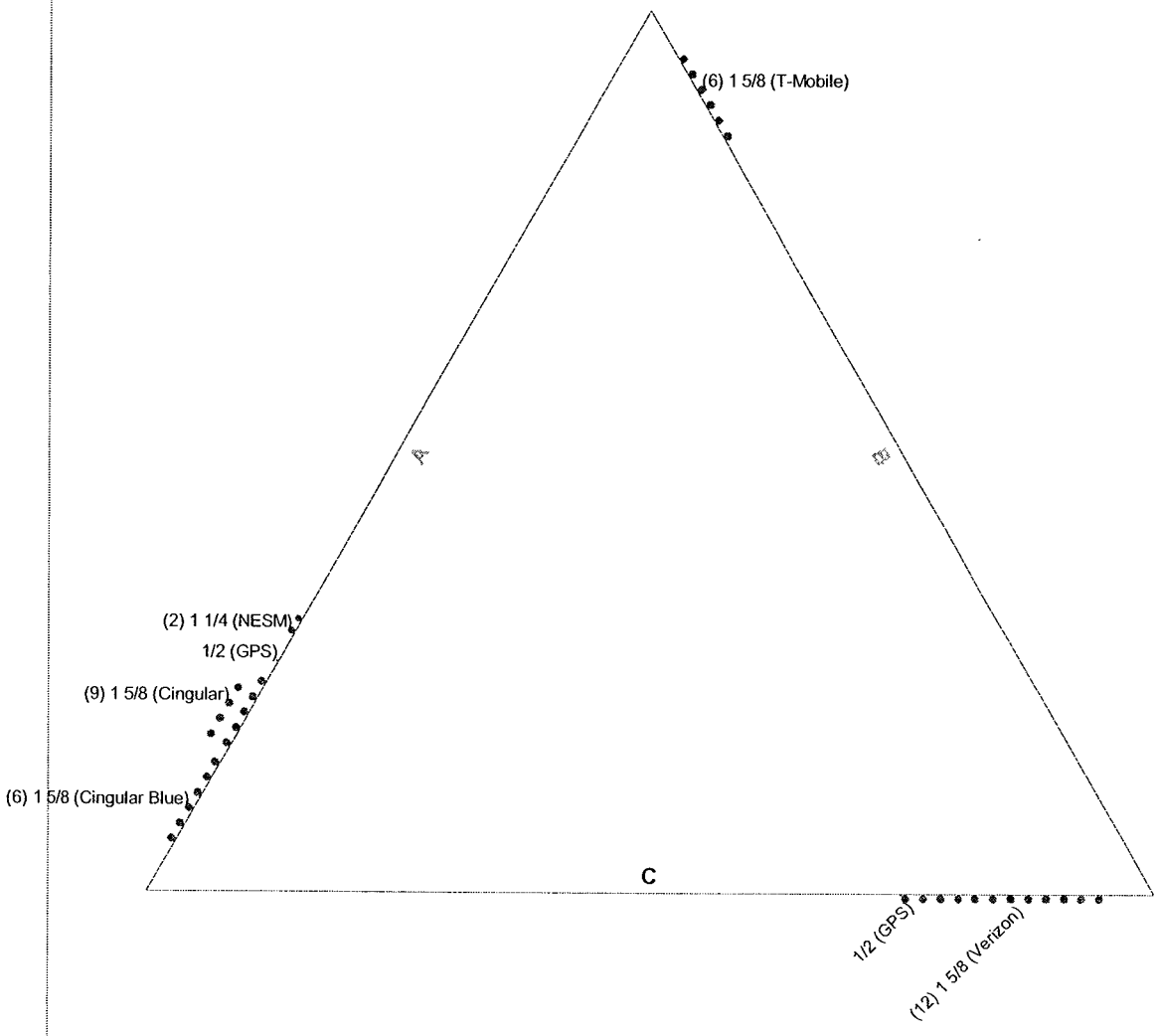
Code: TIA/EIA-222-F	Date: 07/31/06	Scale: NTS	
Path: P:\08\ERI\Files\180' Self-Supporting Lattice Tower.eri		Dwg No. E-7	

RISA TOWER FEEDLINE PLAN

Feedline Plan
26'6"

_____ Round _____ Flat _____ App In Face App Out Face

Section @ 26'6"



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Job: ***180' Self Supporter***			
Project: ***101 Burbank Road Ellington, CT***			
Client: Verizon Wireless	Drawn by: Craig Thomas	App'd:	
Code: TIA/EIA-222-F	Date: 07/31/06	Scale: NTS	
Path: P:\08\ERIFiles\180' Self-Supporting Lattice Tower.eri		Dwg No: E-7	

RISA TOWER DETAILED OUTPUT

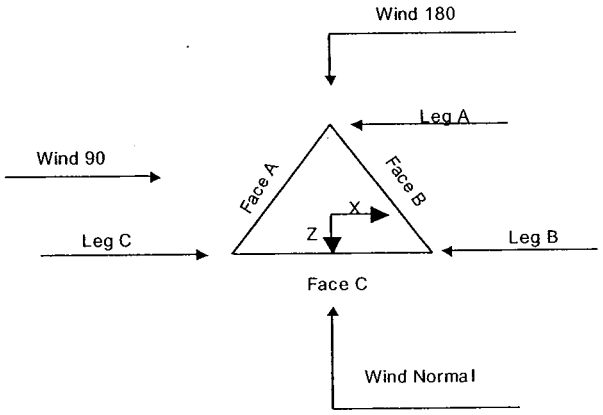
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 186.50 ft above the ground line.
The base of the tower is set at an elevation of 6.50 ft above the ground line.
The face width of the tower is 4.65 ft at the top and 21.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 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 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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	186.50-166.50			4.65	1	20.00
T2	166.50-146.50			4.69	1	20.00
T3	146.50-126.50			6.76	1	20.00
T4	126.50-106.50			8.83	1	20.00
T5	106.50-86.50			10.92	1	20.00
T6	86.50-66.50			12.92	1	20.00
T7	66.50-46.50			14.99	1	20.00
T8	46.50-26.50			16.99	1	20.00
T9	26.50-6.50			19.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	186.50-166.50	4.00	X Brace	No	No	0.0000	0.0000
T2	166.50-146.50	4.00	X Brace	No	No	0.0000	0.0000
T3	146.50-126.50	5.00	X Brace	No	No	0.0000	0.0000
T4	126.50-106.50	6.67	X Brace	No	No	0.0000	0.0000
T5	106.50-86.50	6.67	X Brace	No	No	0.0000	0.0000
T6	86.50-66.50	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
T7	66.50-46.50	10.00	X Brace	No	No	0.0000	0.0000
T8	46.50-26.50	10.00	X Brace	No	No	0.0000	0.0000
T9	26.50-6.50	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 186.50-166.50	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T2 166.50-146.50	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T3 146.50-126.50	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T4 126.50-106.50	Pipe	ROHN 5 STD	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T5 106.50-86.50	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T6 86.50-66.50	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Single Angle	L3 1/2x2 1/2x1/4	A36 (36 ksi)
T7 66.50-46.50	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Single Angle	L3 1/2x2 1/2x1/4	A36 (36 ksi)
T8 46.50-26.50	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T9 26.50-6.50	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Single Angle	L4x4x1/4	A36 (36 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 186.50-166.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 166.50-146.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 146.50-126.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 126.50-106.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 106.50-86.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 86.50-66.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 66.50-46.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 46.50-26.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 26.50-6.50	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
			(36 ksi)					

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Single Diags X	K Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 186.50-166.50	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 166.50-146.50	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T3 146.50-126.50	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T4 126.50-106.50	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T5 106.50-86.50	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T6 86.50-66.50	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T7 66.50-46.50	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T8 46.50-26.50	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T9 26.50-6.50	Yes	Yes	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 186.50-166.50	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
T2 166.50-146.50	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 146.50-126.50	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 126.50-106.50	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 106.50-86.50	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 86.50-66.50	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
T7 66.50-46.50	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 46.50-26.50	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 26.50-6.50	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 186.50-166.50	Flange	0.7500 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
T2 166.50-146.50	Flange	0.8750 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
T3 146.50-126.50	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
T4 126.50-106.50	Flange	1.0000 A325N	6	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 106.50-86.50	Flange	1.0000 A325N	6	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 86.50-66.50	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 66.50-46.50	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 46.50-26.50	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 26.50-6.50	Flange	1.0000 A325N	10	0.7500 A325N	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
1 5/8 (Cingular Blue)	A	Yes	Ar (CfAe)	166.50 - 15.00	0.0000	-0.4	6	6	1.9800	1.9800		1.04
1 1/4 (NESM)	A	Yes	Ar (CfAe)	186.50 - 15.00	0.0000	-0.2	2	2	1.5500	1.5500		0.66
1 5/8 (T-Mobile)	B	Yes	Ar (CfAe)	186.50 - 15.00	0.0000	-0.4	6	6	1.9800	1.9800		1.04
1 5/8 (Verizon)	C	Yes	Ar (CfAe)	176.50 - 15.00	0.0000	-0.35	12	12	1.9800	1.9800		1.04
1 5/8 (Cingular)	A	Yes	Ar (CfAe)	156.50 - 15.00	0.0000	-0.3	9	5	1.9800	1.9800		1.04
1/2 (GPS)	C	Yes	Ar (CfAe)	76.50 - 6.50	0.0000	-0.25	1	1	0.5800	0.5800		0.25

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
1/2 (GPS)	A	Yes	Ar (CfAe)	36.50 - 6.50	0.0000	-0.24	1	1	0.5800	0.5800		0.25

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 lb
T1	186.50-166.50	A	5.167	0.000	0.000	0.000	26.40
		B	19.800	0.000	0.000	0.000	124.80
		C	19.800	0.000	0.000	0.000	124.80
T2	166.50-146.50	A	33.217	0.000	0.000	0.000	244.80
		B	19.800	0.000	0.000	0.000	124.80
		C	39.600	0.000	0.000	0.000	249.60
T3	146.50-126.50	A	41.467	0.000	0.000	0.000	338.40
		B	19.800	0.000	0.000	0.000	124.80
		C	39.600	0.000	0.000	0.000	249.60
T4	126.50-106.50	A	41.467	0.000	0.000	0.000	338.40
		B	19.800	0.000	0.000	0.000	124.80
		C	39.600	0.000	0.000	0.000	249.60
T5	106.50-86.50	A	41.467	0.000	0.000	0.000	338.40
		B	19.800	0.000	0.000	0.000	124.80
		C	39.600	0.000	0.000	0.000	249.60
T6	86.50-66.50	A	41.467	0.000	0.000	0.000	338.40
		B	19.800	0.000	0.000	0.000	124.80
		C	40.083	0.000	0.000	0.000	252.10
T7	66.50-46.50	A	41.467	0.000	0.000	0.000	338.40
		B	19.800	0.000	0.000	0.000	124.80
		C	40.567	0.000	0.000	0.000	254.60
T8	46.50-26.50	A	41.950	0.000	0.000	0.000	340.90
		B	19.800	0.000	0.000	0.000	124.80
		C	40.567	0.000	0.000	0.000	254.60
T9	26.50-6.50	A	24.810	0.000	0.000	0.000	199.58
		B	11.385	0.000	0.000	0.000	71.76
		C	23.737	0.000	0.000	0.000	148.52

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 lb
T1	186.50-166.50	A	0.500	8.500	0.000	0.000	0.000	76.49
		B		29.800	0.000	0.000	0.000	306.59
		C		29.800	0.000	0.000	0.000	306.59
T2	166.50-146.50	A	0.500	50.717	0.000	0.000	0.000	613.03
		B		29.800	0.000	0.000	0.000	306.59
		C		59.600	0.000	0.000	0.000	613.19
T3	146.50-126.50	A	0.500	63.133	0.000	0.000	0.000	842.97
		B		29.800	0.000	0.000	0.000	306.59
		C		59.600	0.000	0.000	0.000	613.19
T4	126.50-106.50	A	0.500	63.133	0.000	0.000	0.000	842.97
		B		29.800	0.000	0.000	0.000	306.59
		C		59.600	0.000	0.000	0.000	613.19
T5	106.50-86.50	A	0.500	63.133	0.000	0.000	0.000	842.97

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 lb
		B		29.800	0.000	0.000	0.000	306.59
		C		59.600	0.000	0.000	0.000	613.19
T6	86.50-66.50	A	0.500	63.133	0.000	0.000	0.000	842.97
		B		29.800	0.000	0.000	0.000	306.59
		C		60.917	0.000	0.000	0.000	622.28
T7	66.50-46.50	A	0.500	63.133	0.000	0.000	0.000	842.97
		B		29.800	0.000	0.000	0.000	306.59
		C		62.233	0.000	0.000	0.000	631.38
T8	46.50-26.50	A	0.500	64.450	0.000	0.000	0.000	852.07
		B		29.800	0.000	0.000	0.000	306.59
		C		62.233	0.000	0.000	0.000	631.38
T9	26.50-6.50	A	0.500	38.935	0.000	0.000	0.000	502.91
		B		17.135	0.000	0.000	0.000	176.29
		C		36.903	0.000	0.000	0.000	370.78

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	186.50-166.50	A	0.000	0.000	0.631	1.373
		B	0.000	0.000	2.420	4.815
		C	0.000	0.000	2.420	4.815
T2	166.50-146.50	A	0.000	0.000	3.392	6.906
		B	0.000	0.000	2.022	4.058
		C	0.000	0.000	4.044	8.116
T3	146.50-126.50	A	0.000	0.000	3.291	6.681
		B	0.000	0.000	1.572	3.154
		C	0.000	0.000	3.143	6.307
T4	126.50-106.50	A	0.000	0.000	3.131	6.038
		B	0.000	0.000	1.495	2.850
		C	0.000	0.000	2.990	5.701
T5	106.50-86.50	A	0.000	0.000	2.971	5.730
		B	0.000	0.000	1.419	2.705
		C	0.000	0.000	2.838	5.410
T6	86.50-66.50	A	0.000	0.000	4.023	7.291
		B	0.000	0.000	1.921	3.442
		C	0.000	0.000	3.889	7.035
T7	66.50-46.50	A	0.000	0.000	2.854	5.173
		B	0.000	0.000	1.363	2.442
		C	0.000	0.000	2.792	5.099
T8	46.50-26.50	A	0.000	0.000	3.200	5.736
		B	0.000	0.000	1.510	2.652
		C	0.000	0.000	3.095	5.539
T9	26.50-6.50	A	0.000	0.000	1.850	3.386
		B	0.000	0.000	0.849	1.490
		C	0.000	0.000	1.769	3.210

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	186.50-166.50	3.1160	-1.8109	3.1559	-1.8802
T2	166.50-146.50	0.0709	2.8438	0.0004	2.9685
T3	146.50-126.50	-1.4706	3.8250	-1.6518	4.0668
T4	126.50-106.50	-1.6324	4.4083	-1.8941	4.8337
T5	106.50-86.50	-1.7729	4.9081	-2.0913	5.4649
T6	86.50-66.50	-1.6777	5.0480	-1.9611	5.8449
T7	66.50-46.50	-1.8024	5.8582	-2.0595	6.9670
T8	46.50-26.50	-2.0130	6.1762	-2.4556	7.4329
T9	26.50-6.50	-1.5737	4.5741	-2.1133	5.8271

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
DB222	B	From Leg	0.00	0.0000	196.50	No Ice	1.60	1.60	16.00
(NESM)			0.00			1/2" Ice	2.88	2.88	20.80
			0.00						
PD220	C	From Leg	0.00	0.0000	192.25	No Ice	3.08	3.08	23.00
(NESM)			0.00			1/2" Ice	5.30	5.30	48.68
			0.00						
(3) RR90-17-02DP	A	From Leg	3.00	0.0000	186.50	No Ice	4.36	1.97	18.00
(T-Mobile)			0.00			1/2" Ice	4.77	2.31	40.42
			0.00						
(3) RR90-17-02DP	B	From Leg	3.00	0.0000	186.50	No Ice	4.36	1.97	18.00
(T-Mobile)			0.00			1/2" Ice	4.77	2.31	40.42
			0.00						
(3) RR90-17-02DP	C	From Leg	3.00	0.0000	186.50	No Ice	4.36	1.97	18.00
(T-Mobile)			0.00			1/2" Ice	4.77	2.31	40.42
			0.00						
T-Frame	A	From Leg	1.50	0.0000	186.50	No Ice	12.20	12.20	360.00
(T-Mobile)			0.00			1/2" Ice	17.60	17.60	490.00
			0.00						
T-Frame	B	From Leg	1.50	0.0000	186.50	No Ice	12.20	12.20	360.00
(T-Mobile)			0.00			1/2" Ice	17.60	17.60	490.00
			0.00						
T-Frame	C	From Leg	1.50	0.0000	186.50	No Ice	12.20	12.20	360.00
(T-Mobile)			0.00			1/2" Ice	17.60	17.60	490.00
			0.00						
WPA-80090/4CF	A	From Leg	3.00	0.0000	176.50	No Ice	3.73	2.71	12.00
(Verizon)			6.00			1/2" Ice	4.10	3.01	36.71
			0.00						
DB948F85T2E-M	A	From Leg	3.00	0.0000	176.50	No Ice	1.92	3.26	8.50
(Verizon)			4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
WPA-80090/4CF	A	From Leg	3.00	0.0000	176.50	No Ice	3.73	2.71	12.00
(Verizon)			-6.00			1/2" Ice	4.10	3.01	36.71
			0.00						
DB948F85T2E-M	A	From Leg	3.00	0.0000	176.50	No Ice	1.92	3.26	8.50
(Verizon)			4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
WPA-80090/4CF	B	From Leg	3.00	0.0000	176.50	No Ice	3.73	2.71	12.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(Verizon)			6.00 0.00			1/2" Ice	4.10	3.01	36.71
DB948F85T2E-M	B	From Leg	3.00	0.0000	176.50	No Ice	1.92	3.26	8.50
(Verizon)			4.00 0.00			1/2" Ice	2.22	3.62	27.57
WPA-80090/4CF	B	From Leg	3.00	0.0000	176.50	No Ice	3.73	2.71	12.00
(Verizon)			-6.00 0.00			1/2" Ice	4.10	3.01	36.71
DB948F85T2E-M	B	From Leg	3.00	0.0000	176.50	No Ice	1.92	3.26	8.50
(Verizon)			4.00 0.00			1/2" Ice	2.22	3.62	27.57
WPA-80090/4CF	C	From Leg	3.00	0.0000	176.50	No Ice	3.73	2.71	12.00
(Verizon)			6.00 0.00			1/2" Ice	4.10	3.01	36.71
DB948F85T2E-M	C	From Leg	3.00	0.0000	176.50	No Ice	1.92	3.26	8.50
(Verizon)			4.00 0.00			1/2" Ice	2.22	3.62	27.57
WPA-80090/4CF	C	From Leg	3.00	0.0000	176.50	No Ice	3.73	2.71	12.00
(Verizon)			-6.00 0.00			1/2" Ice	4.10	3.01	36.71
DB948F85T2E-M	C	From Leg	3.00	0.0000	176.50	No Ice	1.92	3.26	8.50
(Verizon)			4.00 0.00			1/2" Ice	2.22	3.62	27.57
T-Frame	A	From Leg	1.50	0.0000	176.50	No Ice	12.20	12.20	360.00
(Verizon)			0.00 0.00			1/2" Ice	17.60	17.60	490.00
T-Frame	B	From Leg	1.50	0.0000	176.50	No Ice	12.20	12.20	360.00
(Verizon)			0.00 0.00			1/2" Ice	17.60	17.60	490.00
T-Frame	C	From Leg	1.50	0.0000	176.50	No Ice	12.20	12.20	360.00
(Verizon)			0.00 0.00			1/2" Ice	17.60	17.60	490.00
(2) 7250.03	A	From Leg	2.00	0.0000	166.50	No Ice	4.00	1.87	15.40
(Cingular Blue)			0.00 0.00			1/2" Ice	4.39	2.33	35.03
(2) 7250.03	B	From Leg	2.00	0.0000	166.50	No Ice	4.00	1.87	15.40
(Cingular Blue)			0.00 0.00			1/2" Ice	4.39	2.33	35.03
(2) 7250.03	C	From Leg	2.00	0.0000	166.50	No Ice	4.00	1.87	15.40
(Cingular Blue)			0.00 0.00			1/2" Ice	4.39	2.33	35.03
T-Arm	A	From Leg	1.00	0.0000	166.50	No Ice	5.50	5.50	129.00
(Cingular Blue)			0.00 0.00			1/2" Ice	6.90	6.90	170.00
T-Arm	B	From Leg	1.00	0.0000	166.50	No Ice	5.50	5.50	129.00
(Cingular Blue)			0.00 0.00			1/2" Ice	6.90	6.90	170.00
T-Arm	C	From Leg	1.00	0.0000	166.50	No Ice	5.50	5.50	129.00
(Cingular Blue)			0.00 0.00			1/2" Ice	6.90	6.90	170.00
(4) DUO1417-8686	A	From Leg	3.00	0.0000	156.50	No Ice	6.53	4.20	20.30
(Cingular)			0.00 0.00			1/2" Ice	6.94	4.57	62.49
(4) DUO1417-8686	B	From Leg	3.00	0.0000	156.50	No Ice	6.53	4.20	20.30
(Cingular)			0.00 0.00			1/2" Ice	6.94	4.57	62.49
(4) DUO1417-8686	C	From Leg	3.00	0.0000	156.50	No Ice	6.53	4.20	20.30

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(Cingular)			0.00			1/2" Ice	6.94	4.57	62.49
			0.00						
T-Frame	A	From Leg	1.50	0.0000	156.50	No Ice	12.20	12.20	360.00
(Cingular)			0.00			1/2" Ice	17.60	17.60	490.00
			0.00						
T-Frame	B	From Leg	1.50	0.0000	156.50	No Ice	12.20	12.20	360.00
(Cingular)			0.00			1/2" Ice	17.60	17.60	490.00
			0.00						
T-Frame	C	From Leg	1.50	0.0000	156.50	No Ice	12.20	12.20	360.00
(Cingular)			0.00			1/2" Ice	17.60	17.60	490.00
			0.00						
(2) Generic TMA	A	From Leg	3.00	0.0000	156.50	No Ice	1.05	0.35	15.00
(Cingular)			0.00			1/2" Ice	1.19	0.45	21.35
			0.00						
(2) Generic TMA	B	From Leg	3.00	0.0000	156.50	No Ice	1.05	0.35	15.00
(Cingular)			0.00			1/2" Ice	1.19	0.45	21.35
			0.00						
(2) Generic TMA	C	From Leg	3.00	0.0000	156.50	No Ice	1.05	0.35	15.00
(Cingular)			0.00			1/2" Ice	1.19	0.45	21.35
			0.00						
GPS	B	From Leg	2.00	0.0000	76.50	No Ice	1.00	1.00	10.00
			0.00			1/2" Ice	1.50	1.50	15.00
			0.00						
GPS	C	From Leg	2.00	0.0000	36.50	No Ice	1.00	1.00	10.00
			0.00			1/2" Ice	1.50	1.50	15.00
			0.00						
2' Sidearm	B	From Leg	1.00	0.0000	75.50	No Ice	3.90	3.90	87.00
			0.00			1/2" Ice	4.40	4.40	97.00
			0.00						
2' Sidearm	C	From Leg	1.00	0.0000	35.50	No Ice	3.90	3.90	87.00
			0.00			1/2" Ice	4.40	4.40	97.00
			0.00						

Tower Pressures - No Ice

$G_H = 1.121$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 186.50-166.50	176.50	1.615	26	98.192	A	10.194	14.750	9.583	38.42	0.000	0.000
					B	8.405	29.383		25.36		
					C	8.405	29.383		25.36		
T2 166.50-146.50	156.50	1.56	26	120.341	A	7.678	44.904	11.687	22.23	0.000	0.000
					B	9.048	31.487		28.83		
					C	7.026	51.287		20.04		
T3 146.50-126.50	136.50	1.5	25	163.410	A	8.487	56.493	15.027	23.13	0.000	0.000
					B	10.207	34.827		33.37		
					C	8.635	54.627		23.75		

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
T4 126.50-106.50	116.50	1.434	23	206.784	A	11.092	60.044	18.577	26.11	0.000	0.000
					B	12.728	38.377		36.35		
					C	11.233	58.177		26.76		
T5 106.50-86.50	96.50	1.359	22	249.455	A	13.336	63.587	22.120	28.76	0.000	0.000
					B	14.888	41.920		38.94		
					C	13.470	61.720		29.42		
T6 86.50-66.50	76.50	1.272	21	290.156	A	21.977	63.589	22.123	25.85	0.000	0.000
					B	24.078	41.923		33.52		
					C	22.111	62.206		26.24		
T7 66.50-46.50	56.50	1.166	19	334.193	A	18.222	70.265	28.798	32.54	0.000	0.000
					B	19.713	48.598		42.16		
					C	18.284	69.365		32.86		
T8 46.50-26.50	36.50	1.029	17	374.293	A	23.157	70.748	28.798	30.67	0.000	0.000
					B	24.847	48.598		39.21		
					C	23.263	69.365		31.09		
T9 26.50-6.50	16.50	1	16	414.393	A	26.897	53.608	28.798	35.77	0.000	0.000
					B	27.898	40.183		42.30		
					C	26.977	52.535		36.22		

Tower Pressure - With Ice

$G_H = 1.121$

Section Elevation	z	K_Z	q_z	t_Z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1 186.50-166.50	176.50	1.615	20	0.5000	99.858	A	12.937	21.417	12.917	37.60	0.000	0.000
						B	9.496	42.717		24.74		
						C	9.496	42.717		24.74		
T2 166.50-146.50	156.50	1.56	19	0.5000	122.010	A	7.855	65.743	15.027	20.42	0.000	0.000
						B	10.703	44.827		27.06		
						C	6.645	74.627		18.49		
T3 146.50-126.50	136.50	1.5	18	0.5000	165.079	A	9.023	81.499	18.366	20.29	0.000	0.000
						B	12.550	48.166		30.25		
						C	9.397	77.966		21.02		
T4 126.50-106.50	116.50	1.434	18	0.5000	208.453	A	11.978	85.050	21.916	22.59	0.000	0.000
						B	15.166	51.716		32.77		
						C	12.316	81.516		23.36		
T5 106.50-86.50	96.50	1.359	17	0.5000	251.124	A	14.925	88.592	25.459	24.59	0.000	0.000
						B	17.951	55.259		34.78		
						C	15.246	85.059		25.38		
T6 86.50-66.50	76.50	1.272	16	0.5000	291.825	A	23.660	88.595	25.462	22.68	0.000	0.000
						B	27.510	55.262		30.76		
						C	23.916	86.379		23.09		
T7 66.50-46.50	56.50	1.166	14	0.5000	335.862	A	19.918	95.270	32.137	27.90	0.000	0.000
						B	22.649	61.937		37.99		
						C	19.991	94.370		28.10		
T8 46.50-26.50	36.50	1.029	13	0.5000	375.962	A	25.014	96.587	32.137	26.43	0.000	0.000
						B	28.098	61.937		35.69		
						C	25.211	94.371		26.87		
T9 26.50-6.50	16.50	1	12	0.5000	416.062	A	30.151	71.072	32.137	31.75	0.000	0.000
						B	32.047	49.272		39.52		
						C	30.328	69.040		32.34		

Tower Pressure - Service

$G_H = 1.121$

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 186.50-166.50	176.50	1.615	10	98.192	A	10.194	14.750	9.583	38.42	0.000	0.000
					B	8.405	29.383		25.36		
					C	8.405	29.383		25.36		
T2 166.50-146.50	156.50	1.56	10	120.341	A	7.678	44.904	11.687	22.23	0.000	0.000
					B	9.048	31.487		28.83		
					C	7.026	51.287		20.04		
T3 146.50-126.50	136.50	1.5	10	163.410	A	8.487	56.493	15.027	23.13	0.000	0.000
					B	10.207	34.827		33.37		
					C	8.635	54.627		23.75		
T4 126.50-106.50	116.50	1.434	9	206.784	A	11.092	60.044	18.577	26.11	0.000	0.000
					B	12.728	38.377		36.35		
					C	11.233	58.177		26.76		
T5 106.50-86.50	96.50	1.359	9	249.455	A	13.336	63.587	22.120	28.76	0.000	0.000
					B	14.888	41.920		38.94		
					C	13.470	61.720		29.42		
T6 86.50-66.50	76.50	1.272	8	290.156	A	21.977	63.589	22.123	25.85	0.000	0.000
					B	24.078	41.923		33.52		
					C	22.111	62.206		26.24		
T7 66.50-46.50	56.50	1.166	7	334.193	A	18.222	70.265	28.798	32.54	0.000	0.000
					B	19.713	48.598		42.16		
					C	18.284	69.365		32.86		
T8 46.50-26.50	36.50	1.029	7	374.293	A	23.157	70.748	28.798	30.67	0.000	0.000
					B	24.847	48.598		39.21		
					C	23.263	69.365		31.09		
T9 26.50-6.50	16.50	1	6	414.393	A	26.897	53.608	28.798	35.77	0.000	0.000
					B	27.898	40.183		42.30		
					C	26.977	52.535		36.22		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 186.50-166.50	276.00	1005.05	A	0.254	2.425	0.603	1	1	19.086	1700.21	85.01	C
			B	0.385	2.095	0.646	1	1	27.373			
			C	0.385	2.095	0.646	1	1	27.373			
T2 166.50-146.50	619.20	1286.47	A	0.437	1.995	0.667	1	1	37.646	2333.47	116.67	C
			B	0.337	2.203	0.628	1	1	28.818			
			C	0.485	1.921	0.69	1	1	42.402			
T3 146.50-126.50	712.80	1611.36	A	0.398	2.069	0.651	1	1	45.244	2578.71	128.94	A
			B	0.276	2.363	0.609	1	1	31.407			
			C	0.387	2.09	0.646	1	1	43.948			
T4 126.50-106.50	712.80	1748.35	A	0.344	2.186	0.63	1	1	48.941	2816.58	140.83	A
			B	0.247	2.446	0.601	1	1	35.799			
			C	0.336	2.205	0.627	1	1	47.737			
T5 106.50-86.50	712.80	2368.67	A	0.308	2.274	0.618	1	1	52.664	2988.29	149.41	A
			B	0.228	2.506	0.596	1	1	39.892			
			C	0.301	2.292	0.616	1	1	51.510			
T6 86.50-	715.30	3083.42	A	0.295	2.31	0.614	1	1	61.043	3292.20	164.61	A

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
66.50			B	0.227	2.507	0.596	1	1	49.081			
			C	0.291	2.321	0.613	1	1	60.247			
T7 66.50-46.50	717.80	3096.84	A	0.265	2.394	0.606	1	1	60.785	3116.05	155.80	A
			B	0.204	2.581	0.591	1	1	48.450			
			C	0.262	2.401	0.605	1	1	60.255			
T8 46.50-26.50	720.30	4241.21	A	0.251	2.435	0.602	1	1	65.755	3026.08	151.30	A
			B	0.196	2.609	0.59	1	1	53.502			
			C	0.247	2.445	0.601	1	1	64.967			
T9 26.50-6.50	419.86	4381.64	A	0.194	2.615	0.589	1	1	58.485	2808.89	140.44	A
			B	0.164	2.72	0.584	1	1	51.355			
			C	0.192	2.623	0.589	1	1	57.908			
Sum Weight:	5606.86	22823.00						OTM	2058186.17 lb-ft	24660.48		

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	lb	lb							ft^2	lb	plf	
T1 186.50-166.50	276.00	1005.05	A	0.254	2.425	0.603	0.825	1	17.303	1608.85	80.44	C
			B	0.385	2.095	0.646	0.825	1	25.902			
			C	0.385	2.095	0.646	0.825	1	25.902			
T2 166.50-146.50	619.20	1286.47	A	0.437	1.995	0.667	0.825	1	36.302	2265.80	113.29	C
			B	0.337	2.203	0.628	0.825	1	27.235			
			C	0.485	1.921	0.69	0.825	1	41.172			
T3 146.50-126.50	712.80	1611.36	A	0.398	2.069	0.651	0.825	1	43.759	2494.06	124.70	A
			B	0.276	2.363	0.609	0.825	1	29.621			
			C	0.387	2.09	0.646	0.825	1	42.437			
T4 126.50-106.50	712.80	1748.35	A	0.344	2.186	0.63	0.825	1	47.000	2704.86	135.24	A
			B	0.247	2.446	0.601	0.825	1	33.571			
			C	0.336	2.205	0.627	0.825	1	45.771			
T5 106.50-86.50	712.80	2368.67	A	0.308	2.274	0.618	0.825	1	50.330	2855.87	142.79	A
			B	0.228	2.506	0.596	0.825	1	37.286			
			C	0.301	2.292	0.616	0.825	1	49.153			
T6 86.50-66.50	715.30	3083.42	A	0.295	2.31	0.614	0.825	1	57.197	3084.78	154.24	A
			B	0.227	2.507	0.596	0.825	1	44.867			
			C	0.291	2.321	0.613	0.825	1	56.378			
T7 66.50-46.50	717.80	3096.84	A	0.265	2.394	0.606	0.825	1	57.596	2952.58	147.63	A
			B	0.204	2.581	0.591	0.825	1	45.000			
			C	0.262	2.401	0.605	0.825	1	57.055			
T8 46.50-26.50	720.30	4241.21	A	0.251	2.435	0.602	0.825	1	61.702	2839.58	141.98	A
			B	0.196	2.609	0.59	0.825	1	49.154			
			C	0.247	2.445	0.601	0.825	1	60.896			
T9 26.50-6.50	419.86	4381.64	A	0.194	2.615	0.589	0.825	1	53.778	2582.83	129.14	A
			B	0.164	2.72	0.584	0.825	1	46.473			
			C	0.192	2.623	0.589	0.825	1	53.187			
Sum Weight:	5606.86	22823.00						OTM	1966745.02 lb-ft	23389.21		

Tower Forces - No Ice - Wind 60 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	lb	lb							ft^2	lb	plf	
T1 186.50-166.50	276.00	1005.05	A	0.254	2.425	0.603	0.8	1	17.048	1595.80	79.79	C
			B	0.385	2.095	0.646	0.8	1	25.692			
			C	0.385	2.095	0.646	0.8	1	25.692			
T2 166.50-146.50	619.20	1286.47	A	0.437	1.995	0.667	0.8	1	36.110	2256.13	112.81	C
			B	0.337	2.203	0.628	0.8	1	27.009			
			C	0.485	1.921	0.69	0.8	1	40.997			
T3 146.50-126.50	712.80	1611.36	A	0.398	2.069	0.651	0.8	1	43.547	2481.97	124.10	A
			B	0.276	2.363	0.609	0.8	1	29.365			
			C	0.387	2.09	0.646	0.8	1	42.221			
T4 126.50-106.50	712.80	1748.35	A	0.344	2.186	0.63	0.8	1	46.723	2688.90	134.45	A
			B	0.247	2.446	0.601	0.8	1	33.253			
			C	0.336	2.205	0.627	0.8	1	45.491			
T5 106.50-86.50	712.80	2368.67	A	0.308	2.274	0.618	0.8	1	49.997	2836.95	141.85	A
			B	0.228	2.506	0.596	0.8	1	36.914			
			C	0.301	2.292	0.616	0.8	1	48.816			
T6 86.50-66.50	715.30	3083.42	A	0.295	2.31	0.614	0.8	1	56.647	3055.15	152.76	A
			B	0.227	2.507	0.596	0.8	1	44.265			
			C	0.291	2.321	0.613	0.8	1	55.825			
T7 66.50-46.50	717.80	3096.84	A	0.265	2.394	0.606	0.8	1	57.141	2929.23	146.46	A
			B	0.204	2.581	0.591	0.8	1	44.507			
			C	0.262	2.401	0.605	0.8	1	56.598			
T8 46.50-26.50	720.30	4241.21	A	0.251	2.435	0.602	0.8	1	61.123	2812.94	140.65	A
			B	0.196	2.609	0.59	0.8	1	48.533			
			C	0.247	2.445	0.601	0.8	1	60.315			
T9 26.50-6.50	419.86	4381.64	A	0.194	2.615	0.589	0.8	1	53.106	2550.53	127.53	A
			B	0.164	2.72	0.584	0.8	1	45.776			
			C	0.192	2.623	0.589	0.8	1	52.513			
Sum Weight:	5606.86	22823.00						OTM	1953682.0 0 lb-ft	23207.60		

Tower Forces - No Ice - Wind 90 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	lb	lb							ft^2	lb	plf	
T1 186.50-166.50	276.00	1005.05	A	0.254	2.425	0.603	0.85	1	17.557	1621.90	81.10	C
			B	0.385	2.095	0.646	0.85	1	26.112			
			C	0.385	2.095	0.646	0.85	1	26.112			
T2 166.50-146.50	619.20	1286.47	A	0.437	1.995	0.667	0.85	1	36.494	2275.47	113.77	C
			B	0.337	2.203	0.628	0.85	1	27.461			
			C	0.485	1.921	0.69	0.85	1	41.348			
T3 146.50-126.50	712.80	1611.36	A	0.398	2.069	0.651	0.85	1	43.971	2506.16	125.31	A
			B	0.276	2.363	0.609	0.85	1	29.876			
			C	0.387	2.09	0.646	0.85	1	42.652			
T4 126.50-106.50	712.80	1748.35	A	0.344	2.186	0.63	0.85	1	47.277	2720.82	136.04	A
			B	0.247	2.446	0.601	0.85	1	33.890			
			C	0.336	2.205	0.627	0.85	1	46.052			
T5 106.50-86.50	712.80	2368.67	A	0.308	2.274	0.618	0.85	1	50.663	2874.79	143.74	A
			B	0.228	2.506	0.596	0.85	1	37.658			
			C	0.301	2.292	0.616	0.85	1	49.489			
T6 86.50-66.50	715.30	3083.42	A	0.295	2.31	0.614	0.85	1	57.746	3114.41	155.72	A
			B	0.227	2.507	0.596	0.85	1	45.469			
			C	0.291	2.321	0.613	0.85	1	56.931			
T7 66.50-46.50	717.80	3096.84	A	0.265	2.394	0.606	0.85	1	58.052	2975.93	148.80	A
			B	0.204	2.581	0.591	0.85	1	45.493			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.262	2.401	0.605	0.85	1	57.513			
T8 46.50-26.50	720.30	4241.21	A	0.251	2.435	0.602	0.85	1	62.281	2866.23	143.31	A
			B	0.196	2.609	0.59	0.85	1	49.775			
			C	0.247	2.445	0.601	0.85	1	61.478			
T9 26.50-6.50	419.86	4381.64	A	0.194	2.615	0.589	0.85	1	54.451	2615.12	130.76	A
			B	0.164	2.72	0.584	0.85	1	47.171			
			C	0.192	2.623	0.589	0.85	1	53.862			
Sum Weight:	5606.86	22823.00						OTM	1979808.04 lb-ft	23570.82		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 186.50-166.50	689.68	1524.00	A	0.344	2.185	0.63	1	1	26.438	1656.94	82.85	C
			B	0.523	1.872	0.709	1	1	39.800			
			C	0.523	1.872	0.709	1	1	39.800			
T2 166.50-146.50	1532.81	1839.78	A	0.603	1.802	0.756	1	1	57.529	2523.94	126.20	C
			B	0.455	1.965	0.676	1	1	40.990			
			C	0.666	1.778	0.796	1	1	66.069			
T3 146.50-126.50	1762.76	2225.84	A	0.548	1.845	0.723	1	1	67.976	2591.69	129.58	A
			B	0.368	2.131	0.639	1	1	43.328			
			C	0.529	1.865	0.713	1	1	64.974			
T4 126.50-106.50	1762.76	2470.12	A	0.465	1.949	0.68	1	1	69.854	2688.72	134.44	A
			B	0.321	2.242	0.623	1	1	47.360			
			C	0.45	1.973	0.673	1	1	67.204			
T5 106.50-86.50	1762.76	3202.29	A	0.412	2.04	0.657	1	1	73.100	2791.26	139.56	A
			B	0.292	2.319	0.613	1	1	51.844			
			C	0.399	2.065	0.651	1	1	70.651			
T6 86.50-66.50	1771.85	4101.03	A	0.385	2.095	0.645	1	1	80.845	2966.44	148.32	A
			B	0.284	2.34	0.611	1	1	61.277			
			C	0.378	2.109	0.643	1	1	79.445			
T7 66.50-46.50	1780.95	4046.45	A	0.343	2.188	0.63	1	1	79.937	2809.01	140.45	A
			B	0.252	2.432	0.602	1	1	59.956			
			C	0.341	2.194	0.629	1	1	79.363			
T8 46.50-26.50	1790.05	5439.26	A	0.323	2.236	0.623	1	1	85.222	2700.68	135.03	A
			B	0.239	2.469	0.599	1	1	65.214			
			C	0.318	2.249	0.622	1	1	83.872			
T9 26.50-6.50	1049.97	5654.01	A	0.243	2.458	0.6	1	1	72.808	2464.66	123.23	A
			B	0.195	2.611	0.589	1	1	61.092			
			C	0.239	2.471	0.599	1	1	71.689			
Sum Weight:	13903.58	30502.78						OTM	1997930.41 lb-ft	23193.34		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 186.50-166.50	689.68	1524.00	A	0.344	2.185	0.63	0.825	1	24.174	1587.75	79.39	C
			B	0.523	1.872	0.709	0.825	1	38.139			
			C	0.523	1.872	0.709	0.825	1	38.139			
T2 166.50-146.50	1532.81	1839.78	A	0.603	1.802	0.756	0.825	1	56.154	2479.52	123.98	C
			B	0.455	1.965	0.676	0.825	1	39.117			
			C	0.666	1.778	0.796	0.825	1	64.906			
T3 146.50-126.50	1762.76	2225.84	A	0.548	1.845	0.723	0.825	1	66.397	2531.49	126.57	A
			B	0.368	2.131	0.639	0.825	1	41.132			
			C	0.529	1.865	0.713	0.825	1	63.329			
T4 126.50-106.50	1762.76	2470.12	A	0.465	1.949	0.68	0.825	1	67.758	2608.04	130.40	A
			B	0.321	2.242	0.623	0.825	1	44.706			
			C	0.45	1.973	0.673	0.825	1	65.049			
T5 106.50-86.50	1762.76	3202.29	A	0.412	2.04	0.657	0.825	1	70.489	2691.53	134.58	A
			B	0.292	2.319	0.613	0.825	1	48.702			
			C	0.399	2.065	0.651	0.825	1	67.982			
T6 86.50-66.50	1771.85	4101.03	A	0.385	2.095	0.645	0.825	1	76.705	2814.51	140.73	A
			B	0.284	2.34	0.611	0.825	1	56.462			
			C	0.378	2.109	0.643	0.825	1	75.260			
T7 66.50-46.50	1780.95	4046.45	A	0.343	2.188	0.63	0.825	1	76.451	2686.52	134.33	A
			B	0.252	2.432	0.602	0.825	1	55.993			
			C	0.341	2.194	0.629	0.825	1	75.864			
T8 46.50-26.50	1790.05	5439.26	A	0.323	2.236	0.623	0.825	1	80.845	2561.96	128.10	A
			B	0.239	2.469	0.599	0.825	1	60.297			
			C	0.318	2.249	0.622	0.825	1	79.460			
T9 26.50-6.50	1049.97	5654.01	A	0.243	2.458	0.6	0.825	1	67.531	2286.04	114.30	A
			B	0.195	2.611	0.589	0.825	1	55.484			
			C	0.239	2.471	0.599	0.825	1	66.382			
Sum Weight:	13903.58	30502.78						OTM	1931121.59 lb-ft	22247.36		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 186.50-166.50	689.68	1524.00	A	0.344	2.185	0.63	0.8	1	23.850	1577.87	78.89	C
			B	0.523	1.872	0.709	0.8	1	37.901			
			C	0.523	1.872	0.709	0.8	1	37.901			
T2 166.50-146.50	1532.81	1839.78	A	0.603	1.802	0.756	0.8	1	55.958	2473.17	123.66	C
			B	0.455	1.965	0.676	0.8	1	38.849			
			C	0.666	1.778	0.796	0.8	1	64.740			
T3 146.50-126.50	1762.76	2225.84	A	0.548	1.845	0.723	0.8	1	66.171	2522.89	126.14	A
			B	0.368	2.131	0.639	0.8	1	40.818			
			C	0.529	1.865	0.713	0.8	1	63.094			
T4 126.50-106.50	1762.76	2470.12	A	0.465	1.949	0.68	0.8	1	67.458	2596.51	129.83	A
			B	0.321	2.242	0.623	0.8	1	44.327			
			C	0.45	1.973	0.673	0.8	1	64.741			
T5 106.50-86.50	1762.76	3202.29	A	0.412	2.04	0.657	0.8	1	70.115	2677.28	133.86	A
			B	0.292	2.319	0.613	0.8	1	48.254			
			C	0.399	2.065	0.651	0.8	1	67.601			
T6 86.50-66.50	1771.85	4101.03	A	0.385	2.095	0.645	0.8	1	76.113	2792.81	139.64	A
			B	0.284	2.34	0.611	0.8	1	55.775			
			C	0.378	2.109	0.643	0.8	1	74.662			
T7 66.50-46.50	1780.95	4046.45	A	0.343	2.188	0.63	0.8	1	75.953	2669.02	133.45	A
			B	0.252	2.432	0.602	0.8	1	55.427			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.341	2.194	0.629	0.8	1	75.364			
T8 46.50-26.50	1790.05	5439.26	A	0.323	2.236	0.623	0.8	1	80.219	2542.14	127.11	A
			B	0.239	2.469	0.599	0.8	1	59.594			
			C	0.318	2.249	0.622	0.8	1	78.829			
T9 26.50-6.50	1049.97	5654.01	A	0.243	2.458	0.6	0.8	1	66.777	2260.53	113.03	A
			B	0.195	2.611	0.589	0.8	1	54.683			
			C	0.239	2.471	0.599	0.8	1	65.624			
Sum Weight:	13903.58	30502.78						OTM	1921577.48 lb-ft	22112.22		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 186.50-166.50	689.68	1524.00	A	0.344	2.185	0.63	0.85	1	24.497	1597.64	79.88	C
			B	0.523	1.872	0.709	0.85	1	38.376			
			C	0.523	1.872	0.709	0.85	1	38.376			
T2 166.50-146.50	1532.81	1839.78	A	0.603	1.802	0.756	0.85	1	56.350	2485.86	124.29	C
			B	0.455	1.965	0.676	0.85	1	39.384			
			C	0.666	1.778	0.796	0.85	1	65.073			
T3 146.50-126.50	1762.76	2225.84	A	0.548	1.845	0.723	0.85	1	66.622	2540.09	127.00	A
			B	0.368	2.131	0.639	0.85	1	41.446			
			C	0.529	1.865	0.713	0.85	1	63.564			
T4 126.50-106.50	1762.76	2470.12	A	0.465	1.949	0.68	0.85	1	68.057	2619.56	130.98	A
			B	0.321	2.242	0.623	0.85	1	45.085			
			C	0.45	1.973	0.673	0.85	1	65.357			
T5 106.50-86.50	1762.76	3202.29	A	0.412	2.04	0.657	0.85	1	70.862	2705.77	135.29	A
			B	0.292	2.319	0.613	0.85	1	49.151			
			C	0.399	2.065	0.651	0.85	1	68.364			
T6 86.50-66.50	1771.85	4101.03	A	0.385	2.095	0.645	0.85	1	77.296	2836.22	141.81	A
			B	0.284	2.34	0.611	0.85	1	57.150			
			C	0.378	2.109	0.643	0.85	1	75.857			
T7 66.50-46.50	1780.95	4046.45	A	0.343	2.188	0.63	0.85	1	76.949	2704.02	135.20	A
			B	0.252	2.432	0.602	0.85	1	56.559			
			C	0.341	2.194	0.629	0.85	1	76.364			
T8 46.50-26.50	1790.05	5439.26	A	0.323	2.236	0.623	0.85	1	81.470	2581.78	129.09	A
			B	0.239	2.469	0.599	0.85	1	60.999			
			C	0.318	2.249	0.622	0.85	1	80.090			
T9 26.50-6.50	1049.97	5654.01	A	0.243	2.458	0.6	0.85	1	68.285	2311.56	115.58	A
			B	0.195	2.611	0.589	0.85	1	56.285			
			C	0.239	2.471	0.599	0.85	1	67.140			
Sum Weight:	13903.58	30502.78						OTM	1940665.71 lb-ft	22382.50		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 186.50-166.50	276.00	1005.05	A	0.254	2.425	0.603	1	1	19.086	664.14	33.21	C
			B	0.385	2.095	0.646	1	1	27.373			
			C	0.385	2.095	0.646	1	1	27.373			
T2 166.50-146.50	619.20	1286.47	A	0.437	1.995	0.667	1	1	37.646	911.51	45.58	C
			B	0.337	2.203	0.628	1	1	28.818			
			C	0.485	1.921	0.69	1	1	42.402			
T3 146.50-126.50	712.80	1611.36	A	0.398	2.069	0.651	1	1	45.244	1007.31	50.37	A
			B	0.276	2.363	0.609	1	1	31.407			
			C	0.387	2.09	0.646	1	1	43.948			
T4 126.50-106.50	712.80	1748.35	A	0.344	2.186	0.63	1	1	48.941	1100.22	55.01	A
			B	0.247	2.446	0.601	1	1	35.799			
			C	0.336	2.205	0.627	1	1	47.737			
T5 106.50-86.50	712.80	2368.67	A	0.308	2.274	0.618	1	1	52.664	1167.30	58.37	A
			B	0.228	2.506	0.596	1	1	39.892			
			C	0.301	2.292	0.616	1	1	51.510			
T6 86.50-66.50	715.30	3083.42	A	0.295	2.31	0.614	1	1	61.043	1286.02	64.30	A
			B	0.227	2.507	0.596	1	1	49.081			
			C	0.291	2.321	0.613	1	1	60.247			
T7 66.50-46.50	717.80	3096.84	A	0.265	2.394	0.606	1	1	60.785	1217.21	60.86	A
			B	0.204	2.581	0.591	1	1	48.450			
			C	0.262	2.401	0.605	1	1	60.255			
T8 46.50-26.50	720.30	4241.21	A	0.251	2.435	0.602	1	1	65.755	1182.06	59.10	A
			B	0.196	2.609	0.59	1	1	53.502			
			C	0.247	2.445	0.601	1	1	64.967			
T9 26.50-6.50	419.86	4381.64	A	0.194	2.615	0.589	1	1	58.485	1097.22	54.86	A
			B	0.164	2.72	0.584	1	1	51.355			
			C	0.192	2.623	0.589	1	1	57.908			
Sum Weight:	5606.86	22823.00						OTM	803978.97 lb-ft	9633.00		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 186.50-166.50	276.00	1005.05	A	0.254	2.425	0.603	0.825	1	17.303	628.46	31.42	C
			B	0.385	2.095	0.646	0.825	1	25.902			
			C	0.385	2.095	0.646	0.825	1	25.902			
T2 166.50-146.50	619.20	1286.47	A	0.437	1.995	0.667	0.825	1	36.302	885.08	44.25	C
			B	0.337	2.203	0.628	0.825	1	27.235			
			C	0.485	1.921	0.69	0.825	1	41.172			
T3 146.50-126.50	712.80	1611.36	A	0.398	2.069	0.651	0.825	1	43.759	974.24	48.71	A
			B	0.276	2.363	0.609	0.825	1	29.621			
			C	0.387	2.09	0.646	0.825	1	42.437			
T4 126.50-106.50	712.80	1748.35	A	0.344	2.186	0.63	0.825	1	47.000	1056.59	52.83	A
			B	0.247	2.446	0.601	0.825	1	33.571			
			C	0.336	2.205	0.627	0.825	1	45.771			
T5 106.50-86.50	712.80	2368.67	A	0.308	2.274	0.618	0.825	1	50.330	1115.57	55.78	A
			B	0.228	2.506	0.596	0.825	1	37.286			
			C	0.301	2.292	0.616	0.825	1	49.153			
T6 86.50-66.50	715.30	3083.42	A	0.295	2.31	0.614	0.825	1	57.197	1204.99	60.25	A
			B	0.227	2.507	0.596	0.825	1	44.867			
			C	0.291	2.321	0.613	0.825	1	56.378			
T7 66.50-46.50	717.80	3096.84	A	0.265	2.394	0.606	0.825	1	57.596	1153.35	57.67	A
			B	0.204	2.581	0.591	0.825	1	45.000			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.262	2.401	0.605	0.825	1	57.055			
T8 46.50-26.50	720.30	4241.21	A	0.251	2.435	0.602	0.825	1	61.702	1109.21	55.46	A
			B	0.196	2.609	0.59	0.825	1	49.154			
			C	0.247	2.445	0.601	0.825	1	60.896			
T9 26.50-6.50	419.86	4381.64	A	0.194	2.615	0.589	0.825	1	53.778	1008.92	50.45	A
			B	0.164	2.72	0.584	0.825	1	46.473			
			C	0.192	2.623	0.589	0.825	1	53.187			
Sum Weight:	5606.86	22823.00						OTM	768259.77 lb-ft	9136.41		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 186.50-166.50	276.00	1005.05	A	0.254	2.425	0.603	0.8	1	17.048	623.36	31.17	C
			B	0.385	2.095	0.646	0.8	1	25.692			
			C	0.385	2.095	0.646	0.8	1	25.692			
T2 166.50-146.50	619.20	1286.47	A	0.437	1.995	0.667	0.8	1	36.110	881.30	44.07	C
			B	0.337	2.203	0.628	0.8	1	27.009			
			C	0.485	1.921	0.69	0.8	1	40.997			
T3 146.50-126.50	712.80	1611.36	A	0.398	2.069	0.651	0.8	1	43.547	969.52	48.48	A
			B	0.276	2.363	0.609	0.8	1	29.365			
			C	0.387	2.09	0.646	0.8	1	42.221			
T4 126.50-106.50	712.80	1748.35	A	0.344	2.186	0.63	0.8	1	46.723	1050.35	52.52	A
			B	0.247	2.446	0.601	0.8	1	33.253			
			C	0.336	2.205	0.627	0.8	1	45.491			
T5 106.50-86.50	712.80	2368.67	A	0.308	2.274	0.618	0.8	1	49.997	1108.18	55.41	A
			B	0.228	2.506	0.596	0.8	1	36.914			
			C	0.301	2.292	0.616	0.8	1	48.816			
T6 86.50-66.50	715.30	3083.42	A	0.295	2.31	0.614	0.8	1	56.647	1193.42	59.67	A
			B	0.227	2.507	0.596	0.8	1	44.265			
			C	0.291	2.321	0.613	0.8	1	55.825			
T7 66.50-46.50	717.80	3096.84	A	0.265	2.394	0.606	0.8	1	57.141	1144.23	57.21	A
			B	0.204	2.581	0.591	0.8	1	44.507			
			C	0.262	2.401	0.605	0.8	1	56.598			
T8 46.50-26.50	720.30	4241.21	A	0.251	2.435	0.602	0.8	1	61.123	1098.81	54.94	A
			B	0.196	2.609	0.59	0.8	1	48.533			
			C	0.247	2.445	0.601	0.8	1	60.315			
T9 26.50-6.50	419.86	4381.64	A	0.194	2.615	0.589	0.8	1	53.106	996.30	49.82	A
			B	0.164	2.72	0.584	0.8	1	45.776			
			C	0.192	2.623	0.589	0.8	1	52.513			
Sum Weight:	5606.86	22823.00						OTM	763157.03 lb-ft	9065.47		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 186.50-166.50	276.00	1005.05	A	0.254	2.425	0.603	0.85	1	17.557	633.56	31.68	C
			B	0.385	2.095	0.646	0.85	1	26.112			
			C	0.385	2.095	0.646	0.85	1	26.112			
T2 166.50-146.50	619.20	1286.47	A	0.437	1.995	0.667	0.85	1	36.494	888.85	44.44	C
			B	0.337	2.203	0.628	0.85	1	27.461			
			C	0.485	1.921	0.69	0.85	1	41.348			
T3 146.50-126.50	712.80	1611.36	A	0.398	2.069	0.651	0.85	1	43.971	978.97	48.95	A
			B	0.276	2.363	0.609	0.85	1	29.876			
			C	0.387	2.09	0.646	0.85	1	42.652			
T4 126.50-106.50	712.80	1748.35	A	0.344	2.186	0.63	0.85	1	47.277	1062.82	53.14	A
			B	0.247	2.446	0.601	0.85	1	33.890			
			C	0.336	2.205	0.627	0.85	1	46.052			
T5 106.50-86.50	712.80	2368.67	A	0.308	2.274	0.618	0.85	1	50.663	1122.96	56.15	A
			B	0.228	2.506	0.596	0.85	1	37.658			
			C	0.301	2.292	0.616	0.85	1	49.489			
T6 86.50-66.50	715.30	3083.42	A	0.295	2.31	0.614	0.85	1	57.746	1216.57	60.83	A
			B	0.227	2.507	0.596	0.85	1	45.469			
			C	0.291	2.321	0.613	0.85	1	56.931			
T7 66.50-46.50	717.80	3096.84	A	0.265	2.394	0.606	0.85	1	58.052	1162.47	58.12	A
			B	0.204	2.581	0.591	0.85	1	45.493			
			C	0.262	2.401	0.605	0.85	1	57.513			
T8 46.50-26.50	720.30	4241.21	A	0.251	2.435	0.602	0.85	1	62.281	1119.62	55.98	A
			B	0.196	2.609	0.59	0.85	1	49.775			
			C	0.247	2.445	0.601	0.85	1	61.478			
T9 26.50-6.50	419.86	4381.64	A	0.194	2.615	0.589	0.85	1	54.451	1021.53	51.08	A
			B	0.164	2.72	0.584	0.85	1	47.171			
			C	0.192	2.623	0.589	0.85	1	53.862			
Sum Weight:	5606.86	22823.00						OTM	773362.52 lb-ft	9207.35		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	13045.51					
Bracing Weight	9777.49					
Total Member Self-Weight	22823.00			6418.77	4503.83	
Total Weight	33000.86			6418.77	4503.83	
Wind 0 deg - No Ice		0.00	-33096.85	-3413323.05	4503.83	-2601.65
Wind 30 deg - No Ice		16003.60	-27719.04	-2887287.07	-1666178.02	2728.24
Wind 45 deg - No Ice		22504.08	-22504.08	-2347045.21	-2348960.15	5110.75
Wind 60 deg - No Ice		27404.48	-15821.99	-1651200.06	-2866576.20	7113.12
Wind 90 deg - No Ice		32007.19	0.00	6418.77	-3336859.87	9761.51
Wind 120 deg - No Ice		28662.71	16548.43	1716289.68	-2957079.47	10106.13
Wind 135 deg - No Ice		22504.08	22504.08	2359882.75	-2348960.15	8598.42
Wind 150 deg - No Ice		16003.60	27719.04	2900124.62	-1666178.02	7033.27
Wind 180 deg - No Ice		0.00	31643.97	3321656.43	4503.83	2446.80
Wind 210 deg - No Ice		-16003.60	27719.04	2900124.62	1675185.68	-2728.24
Wind 225 deg - No Ice		-22504.08	22504.08	2359882.75	2357967.81	-5110.75
Wind 240 deg - No Ice		-28662.71	16548.43	1716289.68	2966087.12	-7504.48
Wind 270 deg - No Ice		-32007.19	0.00	6418.77	3345867.53	-9761.51
Wind 300 deg - No Ice		-27404.48	-15821.99	-1651200.06	2875583.86	-9559.92
Wind 315 deg - No Ice		-22504.08	-22504.08	-2347045.21	2357967.81	-8598.42
Wind 330 deg - No Ice		-16003.60	-27719.04	-2887287.07	1675185.68	-7033.27

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Member Ice	7679.78					
Total Weight Ice	51457.50			14571.85	11217.49	
Wind 0 deg - Ice		0.00	-31135.50	-3270373.57	11217.49	-2919.31
Wind 30 deg - Ice		15162.33	-26261.93	-2780681.64	-1602622.87	2767.55
Wind 45 deg - Ice		21347.22	-21347.22	-2260994.36	-2264348.72	5339.87
Wind 60 deg - Ice		26027.86	-15027.19	-1589724.39	-2767505.11	7519.93
Wind 90 deg - Ice		30324.67	0.00	14571.85	-3216463.22	10404.58
Wind 120 deg - Ice		26964.14	15567.75	1657044.56	-2833628.69	10779.27
Wind 135 deg - Ice		21347.22	21347.22	2290138.06	-2264348.72	9290.34
Wind 150 deg - Ice		15162.33	26261.93	2809825.34	-1602622.87	7637.03
Wind 180 deg - Ice		0.00	30054.39	3223164.33	11217.49	2775.42
Wind 210 deg - Ice		-15162.33	26261.93	2809825.34	1625057.85	-2767.55
Wind 225 deg - Ice		-21347.22	21347.22	2290138.06	2286783.70	-5339.87
Wind 240 deg - Ice		-26964.14	15567.75	1657044.56	2856063.67	-7859.96
Wind 270 deg - Ice		-30324.67	0.00	14571.85	3238898.20	-10404.58
Wind 300 deg - Ice		-26027.86	-15027.19	-1589724.39	2789940.09	-10295.35
Wind 315 deg - Ice		-21347.22	-21347.22	-2260994.36	2286783.70	-9290.34
Wind 330 deg - Ice		-15162.33	-26261.93	-2780681.64	1625057.85	-7637.03
Total Weight	33000.86			6418.77	4503.83	
Wind 0 deg - Service		0.00	-12928.46	-1334777.53	212.08	-1016.27
Wind 30 deg - Service		6251.40	-10827.75	-1129294.72	-652398.01	1065.72
Wind 45 deg - Service		8790.66	-8790.66	-918262.74	-919109.78	1996.39
Wind 60 deg - Service		10704.88	-6180.46	-646448.23	-1121303.55	2778.56
Wind 90 deg - Service		12502.81	0.00	1059.12	-1305008.11	3813.09
Wind 120 deg - Service		11196.37	6464.23	668977.45	-1156656.39	3947.71
Wind 135 deg - Service		8790.66	8790.66	920380.99	-919109.78	3358.76
Wind 150 deg - Service		6251.40	10827.75	1131412.97	-652398.01	2747.37
Wind 180 deg - Service		0.00	12360.93	1296073.83	212.08	955.78
Wind 210 deg - Service		-6251.40	10827.75	1131412.97	652822.18	-1065.72
Wind 225 deg - Service		-8790.66	8790.66	920380.99	919533.95	-1996.39
Wind 240 deg - Service		-11196.37	6464.23	668977.45	1157080.56	-2931.44
Wind 270 deg - Service		-12502.81	0.00	1059.12	1305432.28	-3813.09
Wind 300 deg - Service		-10704.88	-6180.46	-646448.23	1121727.72	-3734.34
Wind 315 deg - Service		-8790.66	-8790.66	-918262.74	919533.95	-3358.76
Wind 330 deg - Service		-6251.40	-10827.75	-1129294.72	652822.18	-2747.37

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

Comb. No.	Description
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	186.5 - 166.5	Leg	Max Tension	5	15744.52	53.30	1.07
			Max. Compression	24	-18856.92	149.93	-2.75
			Max. Mx	15	5504.86	476.17	-2.95
			Max. My	14	-589.64	-1.38	501.18
			Max. Vy	7	-382.80	277.63	3.20
			Max. Vx	6	393.14	-1.38	268.25
		Diagonal	Max Tension	9	2491.15	0.00	0.00
			Max. Compression	9	-2576.07	0.00	0.00
			Max. Mx	25	1410.93	31.98	3.52
			Max. My	9	-2442.51	-11.21	6.91
			Max. Vy	25	-16.44	31.98	3.52
			Max. Vx	9	-2.25	0.00	0.00
		Top Girt	Max Tension	19	399.07	0.00	0.00
			Max. Compression	15	-369.73	0.00	0.00
			Max. Mx	18	17.22	-20.58	0.00
			Max. My	32	209.75	0.00	0.01
			Max. Vy	18	17.71	0.00	0.00
			Max. Vx	32	-0.01	0.00	0.00
T2	166.5 - 146.5	Leg	Max Tension	10	41140.82	-9.82	0.26

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Compression	24	-47341.09	158.48	-3.98
			Max. Mx	15	29654.20	635.70	2.68
			Max. My	17	-2147.32	-15.77	-662.34
			Max. Vy	5	-537.03	-423.49	-2.93
			Max. Vx	3	548.95	-15.54	-419.27
		Diagonal	Max Tension	14	3394.81	0.00	0.00
			Max. Compression	14	-3420.37	0.00	0.00
			Max. Mx	24	2627.64	25.36	-0.99
			Max. My	9	-2287.76	-9.46	5.51
			Max. Vy	24	-15.00	25.36	-0.99
			Max. Vx	26	-2.04	0.00	0.00
T3	146.5 - 126.5	Leg	Max Tension	10	64734.31	-213.08	-1.82
			Max. Compression	30	-72978.54	314.77	7.35
			Max. Mx	5	64507.26	-334.72	-7.26
			Max. My	9	-3310.10	-6.75	-382.36
			Max. Vy	22	51.44	-329.84	-8.06
			Max. Vx	9	86.64	-6.75	-382.36
		Diagonal	Max Tension	14	3344.79	0.00	0.00
			Max. Compression	14	-3385.64	0.00	0.00
			Max. Mx	33	2181.27	26.83	-1.52
			Max. My	31	-3205.82	2.55	4.04
			Max. Vy	33	16.60	26.83	-1.52
			Max. Vx	32	-1.21	0.00	0.00
T4	126.5 - 106.5	Leg	Max Tension	10	83666.72	-380.52	-3.85
			Max. Compression	30	-94155.88	343.14	4.82
			Max. Mx	2	-85889.07	390.24	3.33
			Max. My	9	-4153.53	-15.13	-484.58
			Max. Vy	5	50.67	-384.88	-6.56
			Max. Vx	9	63.60	-15.13	-484.58
		Diagonal	Max Tension	6	3670.80	0.00	0.00
			Max. Compression	6	-3779.27	0.00	0.00
			Max. Mx	30	2776.72	57.53	3.92
			Max. My	31	-3589.66	-5.80	6.13
			Max. Vy	30	-25.86	57.53	3.92
			Max. Vx	32	-1.64	0.00	0.00
T5	106.5 - 86.5	Leg	Max Tension	10	102307.44	-457.19	-2.64
			Max. Compression	30	-115574.60	706.78	8.88
			Max. Mx	24	-114987.82	707.45	-15.04
			Max. My	9	-4872.09	-33.66	-712.46
			Max. Vy	2	-90.19	673.24	2.54
			Max. Vx	9	109.71	-33.66	-712.46
		Diagonal	Max Tension	6	4139.76	0.00	0.00
			Max. Compression	6	-4224.63	0.00	0.00
			Max. Mx	30	3174.11	53.35	4.78
			Max. My	32	-3390.86	24.32	6.68
			Max. Vy	27	27.82	52.64	-5.33
			Max. Vx	32	-1.62	0.00	0.00
T6	86.5 - 66.5	Leg	Max Tension	10	119682.47	-516.48	12.34
			Max. Compression	30	-136205.95	506.35	9.86
			Max. Mx	22	112256.05	-975.25	-12.39
			Max. My	9	-6550.83	-13.82	-761.11
			Max. Vy	22	132.63	-975.25	-12.39
			Max. Vx	11	124.84	-34.16	642.73
		Diagonal	Max Tension	6	4501.29	0.00	0.00
			Max. Compression	6	-4540.35	0.00	0.00
			Max. Mx	30	3213.11	85.53	6.80
			Max. My	32	-3737.98	39.79	10.00
			Max. Vy	27	38.94	85.51	-7.34
			Max. Vx	32	-2.17	0.00	0.00
T7	66.5 - 46.5	Leg	Max Tension	10	135441.93	-905.04	-5.31
			Max. Compression	30	-154972.21	150.16	30.25

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Mx	22	126099.31	-2203.69	-30.56
			Max. My	9	-7446.88	-53.06	-1310.31
			Max. Vy	22	260.28	-2203.69	-30.56
			Max. Vx	9	146.09	-53.06	-1310.31
		Diagonal	Max Tension	23	5539.45	0.00	0.00
			Max. Compression	6	-5606.69	0.00	0.00
			Max. Mx	27	3934.27	107.26	-9.71
			Max. My	31	-5280.46	41.53	13.23
			Max. Vy	27	42.78	103.54	9.96
			Max. Vx	31	-2.45	0.00	0.00
T8	46.5 - 26.5	Leg	Max Tension	10	152158.74	-898.21	-6.00
			Max. Compression	30	-176190.36	-2336.62	8.19
			Max. Mx	27	141711.12	-4323.16	-10.95
			Max. My	9	-8995.93	-77.92	-1095.93
			Max. Vy	22	630.17	-4321.87	-9.84
			Max. Vx	9	-204.02	-77.92	-1095.93
		Diagonal	Max Tension	23	6740.30	0.00	0.00
			Max. Compression	23	-6183.99	0.00	0.00
			Max. Mx	27	3665.99	170.93	15.63
			Max. My	32	-5302.17	109.73	18.35
			Max. Vy	27	61.91	170.93	15.63
			Max. Vx	32	-3.31	0.00	0.00
T9	26.5 - 6.5	Leg	Max Tension	10	168269.12	-1011.09	-4.44
			Max. Compression	30	-196895.80	0.00	-0.02
			Max. Mx	30	-183716.65	4862.38	3.08
			Max. My	9	-10725.53	-106.79	-1905.59
			Max. Vy	22	-812.44	-4321.87	-9.84
			Max. Vx	9	-274.00	-106.79	-1905.59
		Diagonal	Max Tension	23	8444.98	0.00	0.00
			Max. Compression	23	-7746.91	0.00	0.00
			Max. Mx	27	2314.62	232.05	-19.72
			Max. My	31	-7656.44	159.65	26.95
			Max. Vy	27	71.10	232.05	-19.72
			Max. Vx	31	-4.07	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	13	199952.56	18070.09	-10193.61
	Max. H_x	13	199952.56	18070.09	-10193.61
	Max. H_z	21	-153567.91	-17677.85	10593.30
	Min. Vert	5	-171409.54	-15869.12	8936.71
	Min. H_x	22	-159096.76	-18422.08	10401.74
	Min. H_z	13	199952.56	18070.09	-10193.61
Leg B	Max. Vert	7	199522.82	-18101.10	-10124.48
	Max. H_x	32	-160168.45	18472.47	10353.70
	Max. H_z	33	-154639.64	17744.43	10516.42
	Min. Vert	15	-171839.28	15907.86	8885.17
	Min. H_x	7	199522.82	-18101.10	-10124.48
	Min. H_z	7	199522.82	-18101.10	-10124.48
Leg A	Max. Vert	2	199206.99	-75.37	20732.60
	Max. H_x	14	10645.45	1790.58	873.58
	Max. H_z	2	199206.99	-75.37	20732.60
	Min. Vert	10	-172154.96	64.00	-18224.84
	Min. H_x	6	10645.43	-1799.52	873.67

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
	Min. H_z	27	-160838.55	66.79	-21186.66

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	33000.86	-0.00	0.00	6418.75	4503.87	-0.08
Dead+Wind 0 deg - No Ice	33000.86	0.00	-33096.42	-3422827.54	4514.29	-2613.93
Dead+Wind 30 deg - No Ice	33000.86	16003.35	-27718.66	-2895365.83	-1670850.86	2719.62
Dead+Wind 45 deg - No Ice	33000.86	22503.74	-22503.77	-2353612.10	-2355547.02	5117.17
Dead+Wind 60 deg - No Ice	33000.86	27404.07	-15821.75	-1655817.46	-2874619.63	7124.76
Dead+Wind 90 deg - No Ice	33000.51	32006.60	0.50	6451.58	-3346201.20	9792.08
Dead+Wind 120 deg - No Ice	33000.86	28662.34	16548.21	1721078.49	-2965308.04	10131.28
Dead+Wind 135 deg - No Ice	33000.86	22503.79	22503.76	2366496.12	-2355537.54	8619.15
Dead+Wind 150 deg - No Ice	33000.86	16003.39	27718.63	2908241.39	-1670836.36	7045.99
Dead+Wind 180 deg - No Ice	33000.86	0.00	31643.49	3330958.94	4514.51	2458.54
Dead+Wind 210 deg - No Ice	33000.86	-16003.39	27718.63	2908239.12	1679864.35	-2719.68
Dead+Wind 225 deg - No Ice	33000.86	-22503.79	22503.76	2366493.70	2364564.40	-5114.21
Dead+Wind 240 deg - No Ice	33000.86	-28662.34	16548.21	1721076.18	2974333.96	-7517.30
Dead+Wind 270 deg - No Ice	33000.52	-32006.60	0.50	6451.10	3355225.85	-9792.03
Dead+Wind 300 deg - No Ice	33000.86	-27404.07	-15821.75	-1655816.14	2883645.08	-9583.26
Dead+Wind 315 deg - No Ice	33000.86	-22503.74	-22503.77	-2353610.44	2364573.42	-8621.48
Dead+Wind 330 deg - No Ice	33000.86	-16003.35	-27718.66	-2895364.49	1679878.42	-7045.96
Dead+Ice+Temp	51457.50	0.00	-0.01	14582.49	11217.00	0.06
Dead+Wind 0 deg+Ice+Temp	51457.50	0.00	-31134.79	-3284389.28	11255.19	-2950.83
Dead+Wind 30 deg+Ice+Temp	51457.50	15161.95	-26261.31	-2792647.32	-1609533.93	2769.77
Dead+Wind 45 deg+Ice+Temp	51457.50	21346.68	-21346.70	-2270731.24	-2274121.34	5350.95
Dead+Wind 60 deg+Ice+Temp	51457.50	26027.21	-15026.82	-1596571.92	-2779453.24	7542.23
Dead+Wind 90 deg+Ice+Temp	51457.50	30323.93	0.02	14643.67	-3230312.18	10443.19
Dead+Wind 120 deg+Ice+Temp	51457.49	26963.51	15567.43	1664146.03	-2845771.07	10834.75
Dead+Wind 135 deg+Ice+Temp	51457.50	21346.73	21346.70	2299997.03	-2274101.34	9348.08
Dead+Wind 150 deg+Ice+Temp	51457.50	15161.99	26261.28	2821902.10	-1609521.54	7693.75
Dead+Wind 180 deg+Ice+Temp	51457.50	0.00	30053.63	3237040.19	11255.76	2806.38
Dead+Wind 210 deg+Ice+Temp	51457.50	-15161.99	26261.28	2821899.01	1632031.41	-2769.83
Dead+Wind 225 deg+Ice+Temp	51457.49	-21346.76	21346.67	2299993.41	2296611.07	-5349.66
Dead+Wind 240 deg+Ice+Temp	51457.50	-26963.51	15567.39	1664141.81	2868277.89	-7882.58
Dead+Wind 270 deg+Ice+Temp	51457.50	-30323.93	0.02	14641.86	3252817.39	-10443.12
Dead+Wind 300 deg+Ice+Temp	51457.50	-26027.21	-15026.82	-1596570.94	2801959.25	-10348.53
Dead+Wind 315 deg+Ice+Temp	51457.50	-21346.67	-21346.70	-2270729.57	2296628.68	-9345.20
Dead+Wind 330 deg+Ice+Temp	51457.50	-15161.94	-26261.31	-2792645.85	1632042.34	-7693.74
Dead+Wind 0 deg - Service	33000.86	0.00	-12928.28	-1333135.82	4512.63	-1021.12
Dead+Wind 30 deg - Service	33000.86	6251.31	-10827.60	-1127093.97	-649931.93	1061.23
Dead+Wind 45 deg - Service	33000.86	8790.53	-8790.53	-915471.18	-917394.43	1999.03
Dead+Wind 60 deg - Service	33000.86	10704.72	-6180.37	-642893.32	-1120159.69	2783.30
Dead+Wind 90 deg - Service	33000.86	12502.63	0.00	6436.12	-1304374.00	3826.08
Dead+Wind 120 deg - Service	33000.86	11196.22	6464.14	676220.42	-1155588.19	3957.74
Dead+Wind 135 deg - Service	33000.86	8790.54	8790.53	928341.44	-917392.08	3366.22
Dead+Wind 150 deg - Service	33000.86	6251.32	10827.59	1139962.79	-649929.15	2751.08
Dead+Wind 180 deg - Service	33000.86	0.00	12360.75	1305091.15	4512.79	960.42
Dead+Wind 210 deg - Service	33000.86	-6251.32	10827.59	1139962.41	658954.60	-1061.27
Dead+Wind 225 deg - Service	33000.86	-8790.54	8790.53	928340.98	926417.35	-1997.16
Dead+Wind 240 deg - Service	33000.86	-11196.22	6464.14	676219.99	1164613.23	-2936.61
Dead+Wind 270 deg - Service	33000.86	-12502.63	0.00	6435.93	1313398.83	-3826.06
Dead+Wind 300 deg - Service	33000.86	-10704.72	-6180.37	-642893.22	1129184.60	-3743.72
Dead+Wind 315 deg - Service	33000.86	-8790.53	-8790.53	-915471.01	926419.42	-3367.93
Dead+Wind 330 deg - Service	33000.86	-6251.31	-10827.60	-1127093.79	658957.11	-2751.06

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	-0.00	-33000.86	0.00	0.00	33000.86	-0.00	0.000%
2	-0.00	-33000.86	-33096.85	-0.00	33000.86	33096.42	0.001%
3	16003.60	-33000.86	-27719.04	-16003.35	33000.86	27718.66	0.001%
4	22504.08	-33000.86	-22504.08	-22503.74	33000.86	22503.77	0.001%
5	27404.48	-33000.86	-15821.99	-27404.07	33000.86	15821.75	0.001%
6	32007.19	-33000.86	0.00	-32006.60	33000.51	-0.50	0.002%
7	28662.71	-33000.86	16548.43	-28662.34	33000.86	-16548.21	0.001%
8	22504.08	-33000.86	22504.08	-22503.79	33000.86	-22503.76	0.001%
9	16003.60	-33000.86	27719.04	-16003.39	33000.86	-27718.63	0.001%
10	0.00	-33000.86	31643.97	-0.00	33000.86	-31643.49	0.001%
11	-16003.60	-33000.86	27719.04	16003.39	33000.86	-27718.63	0.001%
12	-22504.08	-33000.86	22504.08	22503.79	33000.86	-22503.76	0.001%
13	-28662.71	-33000.86	16548.43	28662.34	33000.86	-16548.21	0.001%
14	-32007.19	-33000.86	0.00	32006.60	33000.52	-0.50	0.002%
15	-27404.48	-33000.86	-15821.99	27404.07	33000.86	15821.75	0.001%
16	-22504.08	-33000.86	-22504.08	22503.74	33000.86	22503.77	0.001%
17	-16003.60	-33000.86	-27719.04	16003.35	33000.86	27718.66	0.001%
18	-0.00	-51457.50	0.00	-0.00	51457.50	0.01	0.000%
19	0.00	-51457.50	-31135.50	-0.00	51457.50	31134.79	0.001%
20	15162.33	-51457.50	-26261.93	-15161.95	51457.50	26261.31	0.001%
21	21347.22	-51457.50	-21347.22	-21346.68	51457.50	21346.70	0.001%
22	26027.86	-51457.50	-15027.19	-26027.21	51457.50	15026.82	0.001%
23	30324.67	-51457.50	0.00	-30323.93	51457.50	-0.02	0.001%
24	26964.14	-51457.50	15567.75	-26963.51	51457.49	-15567.43	0.001%
25	21347.22	-51457.50	21347.22	-21346.73	51457.50	-21346.70	0.001%
26	15162.33	-51457.50	26261.93	-15161.99	51457.50	-26261.28	0.001%
27	-0.00	-51457.50	30054.39	-0.00	51457.50	-30053.63	0.001%
28	-15162.33	-51457.50	26261.93	15161.99	51457.50	-26261.28	0.001%
29	-21347.22	-51457.50	21347.22	21346.76	51457.49	-21346.67	0.001%
30	-26964.14	-51457.50	15567.75	26963.51	51457.50	-15567.39	0.001%
31	-30324.67	-51457.50	0.00	30323.93	51457.50	-0.02	0.001%
32	-26027.86	-51457.50	-15027.19	26027.21	51457.50	15026.82	0.001%
33	-21347.22	-51457.50	-21347.22	21346.67	51457.50	21346.70	0.001%
34	-15162.33	-51457.50	-26261.93	15161.94	51457.50	26261.31	0.001%
35	0.00	-33000.86	-12928.46	-0.00	33000.86	12928.28	0.000%
36	6251.40	-33000.86	-10827.75	-6251.31	33000.86	10827.60	0.001%
37	8790.66	-33000.86	-8790.66	-8790.53	33000.86	8790.53	0.001%
38	10704.88	-33000.86	-6180.46	-10704.72	33000.86	6180.37	0.001%
39	12502.81	-33000.86	0.00	-12502.63	33000.86	-0.00	0.001%
40	11196.37	-33000.86	6464.23	-11196.22	33000.86	-6464.14	0.000%
41	8790.66	-33000.86	8790.66	-8790.54	33000.86	-8790.53	0.000%
42	6251.40	-33000.86	10827.75	-6251.32	33000.86	-10827.59	0.001%
43	-0.00	-33000.86	12360.93	-0.00	33000.86	-12360.75	0.001%
44	-6251.40	-33000.86	10827.75	6251.32	33000.86	-10827.59	0.001%
45	-8790.66	-33000.86	8790.66	8790.54	33000.86	-8790.53	0.000%
46	-11196.37	-33000.86	6464.23	11196.22	33000.86	-6464.14	0.001%
47	-12502.81	-33000.86	0.00	12502.63	33000.86	-0.00	0.001%
48	-10704.88	-33000.86	-6180.46	10704.72	33000.86	6180.37	0.001%
49	-8790.66	-33000.86	-8790.66	8790.53	33000.86	8790.53	0.001%
50	-6251.40	-33000.86	-10827.75	6251.31	33000.86	10827.60	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	10	0.00000001	0.00005326
3	Yes	10	0.00000001	0.00005678
4	Yes	10	0.00000001	0.00005905
5	Yes	10	0.00000001	0.00005997
6	Yes	10	0.00000001	0.00005677
7	Yes	10	0.00000001	0.00005326
8	Yes	10	0.00000001	0.00005445
9	Yes	10	0.00000001	0.00005678
10	Yes	10	0.00000001	0.00005995
11	Yes	10	0.00000001	0.00005676
12	Yes	10	0.00000001	0.00005443
13	Yes	10	0.00000001	0.00005324
14	Yes	10	0.00000001	0.00005675
15	Yes	10	0.00000001	0.00005996
16	Yes	10	0.00000001	0.00005905
17	Yes	10	0.00000001	0.00005678
18	Yes	6	0.00000001	0.00000001
19	Yes	10	0.00000001	0.00008983
20	Yes	10	0.00000001	0.00009336
21	Yes	10	0.00000001	0.00009570
22	Yes	10	0.00000001	0.00009665
23	Yes	10	0.00000001	0.00009334
24	Yes	10	0.00000001	0.00008984
25	Yes	10	0.00000001	0.00009102
26	Yes	10	0.00000001	0.00009336
27	Yes	10	0.00000001	0.00009659
28	Yes	10	0.00000001	0.00009329
29	Yes	10	0.00000001	0.00009099
30	Yes	10	0.00000001	0.00008977
31	Yes	10	0.00000001	0.00009328
32	Yes	10	0.00000001	0.00009661
33	Yes	10	0.00000001	0.00009569
34	Yes	10	0.00000001	0.00009337
35	Yes	10	0.00000001	0.00005463
36	Yes	10	0.00000001	0.00005601
37	Yes	10	0.00000001	0.00005690
38	Yes	10	0.00000001	0.00005727
39	Yes	10	0.00000001	0.00005599
40	Yes	10	0.00000001	0.00005463
41	Yes	10	0.00000001	0.00005512
42	Yes	10	0.00000001	0.00005600
43	Yes	10	0.00000001	0.00005724
44	Yes	10	0.00000001	0.00005597
45	Yes	10	0.00000001	0.00005509
46	Yes	10	0.00000001	0.00005460
47	Yes	10	0.00000001	0.00005596
48	Yes	10	0.00000001	0.00005725
49	Yes	10	0.00000001	0.00005689
50	Yes	10	0.00000001	0.00005600

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	186.5 - 166.5	4.939	46	0.2925	0.0093
T2	166.5 - 146.5	3.736	46	0.2654	0.0090
T3	146.5 - 126.5	2.697	46	0.2169	0.0086
T4	126.5 - 106.5	1.855	46	0.1719	0.0074
T5	106.5 - 86.5	1.221	46	0.1209	0.0062
T6	86.5 - 66.5	0.761	46	0.0874	0.0048
T7	66.5 - 46.5	0.427	46	0.0602	0.0034
T8	46.5 - 26.5	0.198	46	0.0365	0.0021
T9	26.5 - 6.5	0.062	46	0.0183	0.0011

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
196.50	DB222	46	4.939	0.2925	0.0093	95570
192.25	PD220	46	4.939	0.2925	0.0093	95570
186.50	(3) RR90-17-02DP	46	4.939	0.2925	0.0093	95570
176.50	WPA-80090/4CF	46	4.325	0.2813	0.0092	47785
166.50	(2) 7250.03	46	3.736	0.2654	0.0090	24988
156.50	(4) DUO1417-8686	46	3.192	0.2423	0.0089	24538
76.50	GPS	46	0.580	0.0736	0.0041	42578
75.50	2' Sidearm	46	0.563	0.0722	0.0040	42856
36.50	GPS	46	0.119	0.0271	0.0016	53611
35.50	2' Sidearm	46	0.112	0.0262	0.0015	53604

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	186.5 - 166.5	12.613	13	0.7477	0.0273
T2	166.5 - 146.5	9.539	13	0.6782	0.0260
T3	146.5 - 126.5	6.886	13	0.5539	0.0242
T4	126.5 - 106.5	4.737	13	0.4388	0.0205
T5	106.5 - 86.5	3.118	13	0.3085	0.0170
T6	86.5 - 66.5	1.942	13	0.2231	0.0130
T7	66.5 - 46.5	1.090	13	0.1537	0.0093
T8	46.5 - 26.5	0.507	13	0.0932	0.0057
T9	26.5 - 6.5	0.158	13	0.0467	0.0029

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
196.50	DB222	13	12.613	0.7477	0.0273	37401
192.25	PD220	13	12.613	0.7477	0.0273	37401
186.50	(3) RR90-17-02DP	13	12.613	0.7477	0.0273	37401

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.50	WPA-80090/4CF	13	11.044	0.7189	0.0266	18700
166.50	(2) 7250.03	13	9.539	0.6782	0.0260	9788
156.50	(4) DUO1417-8686	13	8.150	0.6188	0.0253	9608
76.50	GPS	13	1.480	0.1878	0.0111	16681
75.50	2' Sidearm	13	1.438	0.1843	0.0109	16790
36.50	GPS	13	0.304	0.0690	0.0043	21018
35.50	2' Sidearm	13	0.287	0.0668	0.0041	21017

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	186.5	Leg	A325N	0.7500	4	229.82	19438.60	0.012 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2576.07	6442.72	0.400 ✓	1.333	Bolt Shear
T2	166.5	Leg	A325N	0.8750	4	5221.45	26457.30	0.197 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	3420.37	6442.72	0.531 ✓	1.333	Bolt Shear
T3	146.5	Leg	A325N	1.0000	4	11753.20	34557.50	0.340 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	3385.64	6442.72	0.525 ✓	1.333	Bolt Shear
T4	126.5	Leg	A325N	1.0000	6	11761.40	34557.50	0.340 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	3779.27	6442.72	0.587 ✓	1.333	Bolt Shear
T5	106.5	Leg	A325N	1.0000	6	15016.00	34557.50	0.435 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	4224.63	6442.72	0.656 ✓	1.333	Bolt Shear
T6	86.5	Leg	A325N	1.0000	8	13530.80	34557.50	0.392 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	4540.35	9277.52	0.489 ✓	1.333	Bolt Shear
T7	66.5	Leg	A325N	1.0000	8	15836.50	34557.50	0.458 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	5606.69	9277.52	0.604 ✓	1.333	Bolt Shear
T8	46.5	Leg	A325N	1.0000	8	17996.30	34557.50	0.521 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	6740.30	9277.52	0.727 ✓	1.333	Bolt Shear
T9	26.5	Leg	A325N	1.0000	10	16053.40	34557.50	0.465 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	8444.98	9277.52	0.910 ✓	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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	186.5 - 166.5	ROHN 2.5 STD	20.00	4.00	50.7 K=1.00	24.247	1.7040	-18856.90	41317.80	0.456 ✓
T2	166.5 - 146.5	ROHN 3 EH	20.04	4.01	42.3 K=1.00	25.503	3.0159	-47341.10	76914.70	0.616 ✓
T3	146.5 - 126.5	ROHN 4 EH	20.04	5.01	40.7 K=1.00	25.733	4.4074	-72978.50	113416.00	0.643 ✓
T4	126.5 - 106.5	ROHN 5 STD	20.04	6.68	42.7 K=1.00	25.450	4.2999	-94155.90	109433.00	0.860 ✓
T5	106.5 - 86.5	ROHN 6 EHS	20.03	6.68	36.0 K=1.00	26.379	6.7133	-115575.00	177090.00	0.653 ✓
T6	86.5 - 66.5	ROHN 6 EH	20.04	6.68	36.5 K=1.00	26.311	8.4049	-136206.00	221146.00	0.616 ✓
T7	66.5 - 46.5	ROHN 8 EHS	20.03	10.02	41.2 K=1.00	25.667	9.7193	-154972.00	249468.00	0.621 ✓
T8	46.5 - 26.5	ROHN 8 EH	20.03	10.02	41.8 K=1.00	25.582	12.7627	-176190.00	326496.00	0.540 ✓
T9	26.5 - 6.5	ROHN 8 EH	20.03	10.02	41.8 K=1.00	25.582	12.7627	-196896.00	326497.00	0.603 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	186.5 - 166.5	L2x2x1/4	6.16	2.76	93.5 K=1.10	13.783	0.9380	-2576.07	12928.70	0.199 ✓
T2	166.5 - 146.5	L2x2x1/4	7.33	3.45	109.4 K=1.03	11.751	0.9380	-3420.37	11022.10	0.310 ✓
T3	146.5 - 126.5	L2x2x1/4	9.92	4.73	145.1 K=1.00	7.092	0.9380	-3293.51	6652.19	0.495 ✓
T4	126.5 - 106.5	L2 1/2x2 1/2x1/4	12.50	6.02	147.0 K=1.00	6.910	1.1900	-3779.27	8222.54	0.460 ✓
T5	106.5 - 86.5	L2 1/2x2 1/2x1/4	14.24	6.83	167.0 K=1.00	5.356	1.1900	-4224.63	6374.17	0.663 ✓
T6	86.5 - 66.5	L3 1/2x2 1/2x1/4	16.09	7.77	171.3 K=1.00	5.089	1.4400	-4540.35	7328.02	0.620 ✓
T7	66.5 - 46.5	L3 1/2x2 1/2x1/4	19.29	9.35	206.2 K=1.00	3.511	1.4400	-5606.69	5055.96	1.109 ✓
T8	46.5 - 26.5	KL/R > 200 (C) - 164 L4x4x1/4	21.03	10.23	154.3 K=1.00	6.269	1.9400	-6042.40	12161.30	0.497 ✓
T9	26.5 - 6.5	L4x4x1/4	21.92	10.67	161.1 K=1.00	5.754	1.9400	-7746.91	11162.80	0.694 ✓

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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	186.5 - 166.5	L3x3x1/4	4.65	4.41	104.7 K=1.17	12.374	1.4400	-369.73	17818.60	0.021 ✓

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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	186.5 - 166.5	ROHN 2.5 STD	20.00	4.00	50.7	30.000	1.7040	15744.50	51121.50	0.308 ✓
T2	166.5 - 146.5	ROHN 3 EH	20.04	4.01	42.3	30.000	3.0159	41140.80	90477.90	0.455 ✓
T3	146.5 - 126.5	ROHN 4 EH	20.04	5.01	40.7	30.000	4.4074	64734.30	132223.00	0.490 ✓
T4	126.5 - 106.5	ROHN 5 STD	20.04	6.68	42.7	30.000	4.2999	83666.70	128996.00	0.649 ✓
T5	106.5 - 86.5	ROHN 6 EHS	20.03	6.68	36.0	30.000	6.7133	102307.00	201398.00	0.508 ✓
T6	86.5 - 66.5	ROHN 6 EH	20.04	6.68	36.5	30.000	8.4049	119682.00	252148.00	0.475 ✓
T7	66.5 - 46.5	ROHN 8 EHS	20.03	10.02	41.2	30.000	9.7193	135442.00	291579.00	0.465 ✓
T8	46.5 - 26.5	ROHN 8 EH	20.03	10.02	41.8	30.000	12.7627	152160.00	382882.00	0.397 ✓
T9	26.5 - 6.5	ROHN 8 EH	20.03	10.02	41.8	30.000	12.7627	168269.00	382882.00	0.439 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	186.5 - 166.5	L2x2x1/4	6.16	2.76	57.6	29.000	0.5629	2491.15	16323.40	0.153 ✓
T2	166.5 - 146.5	L2x2x1/4	7.33	3.45	71.3	29.000	0.5629	3394.81	16323.40	0.208 ✓
T3	146.5 - 126.5	L2x2x1/4	8.62	4.08	83.8	29.000	0.5629	3344.79	16323.40	0.205 ✓
T4	126.5 - 106.5	L2 1/2x2 1/2x1/4	12.50	6.02	96.5	29.000	0.7519	3670.80	21804.40	0.168 ✓
T5	106.5 - 86.5	L2 1/2x2 1/2x1/4	14.24	6.83	109.2	29.000	0.7519	4139.76	21804.40	0.190 ✓
T6	86.5 - 66.5	L3 1/2x2 1/2x1/4	16.09	7.77	129.3	29.000	0.9159	4501.29	26562.20	0.169 ✓

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T7	66.5 - 46.5	L3 1/2x2 1/2x1/4	19.29	9.35	155.2	29.000	0.9159	5539.45	26562.20	0.209
T8	46.5 - 26.5	L4x4x1/4	21.03	10.23	99.8	29.000	1.2909	6740.30	37437.20	0.180
T9	26.5 - 6.5	L4x4x1/4	22.81	11.12	108.3	29.000	1.2909	8444.98	37437.20	0.226

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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	186.5 - 166.5	L3x3x1/4	4.65	4.41	56.9	21.600	1.4400	399.07	31104.00	0.013

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	186.5 - 166.5	Leg	ROHN 2.5 STD	2	-18856.90	55076.63	34.2	Pass
T2	166.5 - 146.5	Leg	ROHN 3 EH	38	-47341.10	102527.30	46.2	Pass
T3	146.5 - 126.5	Leg	ROHN 4 EH	70	-72978.50	151183.52	48.3	Pass
T4	126.5 - 106.5	Leg	ROHN 5 STD	97	-94155.90	145874.18	64.5	Pass
T5	106.5 - 86.5	Leg	ROHN 6 EHS	118	-115575.00	236060.96	49.0	Pass
T6	86.5 - 66.5	Leg	ROHN 6 EH	139	-136206.00	294787.61	46.2	Pass
T7	66.5 - 46.5	Leg	ROHN 8 EHS	160	-154972.00	332540.83	46.6	Pass
T8	46.5 - 26.5	Leg	ROHN 8 EH	175	-176190.00	435219.15	40.5	Pass
T9	26.5 - 6.5	Leg	ROHN 8 EH	190	-196896.00	435220.48	45.2	Pass
T1	186.5 - 166.5	Diagonal	L2x2x1/4	9	-2576.07	17233.96	14.9 30.0 (b)	Pass
T2	166.5 - 146.5	Diagonal	L2x2x1/4	46	-3420.37	14692.46	23.3 39.8 (b)	Pass
T3	146.5 - 126.5	Diagonal	L2x2x1/4	74	-3293.51	8867.37	37.1 39.4 (b)	Pass
T4	126.5 - 106.5	Diagonal	L2 1/2x2 1/2x1/4	101	-3779.27	10960.65	34.5 44.0 (b)	Pass
T5	106.5 - 86.5	Diagonal	L2 1/2x2 1/2x1/4	122	-4224.63	8496.77	49.7	Pass
T6	86.5 - 66.5	Diagonal	L3 1/2x2 1/2x1/4	143	-4540.35	9768.25	46.5	Pass
T7	66.5 - 46.5	Diagonal	L3 1/2x2 1/2x1/4	164	-5606.69	6739.59	83.2	Pass
T8	46.5 - 26.5	Diagonal	L4x4x1/4	179	-6042.40	16211.01	37.3 54.5 (b)	Pass
T9	26.5 - 6.5	Diagonal	L4x4x1/4	200	-7746.91	14880.01	52.1 68.3 (b)	Pass
T1	186.5 - 166.5	Top Girt	L3x3x1/4	6	-369.73	23752.19	1.6	Pass
							Summary	
							Leg (T4) 64.5	Pass
							Diagonal (T7) 83.2	Pass
							Top Girt (T1) 1.6	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
						Bolt Checks	68.3	Pass
						RATING =	**83.2**	**Pass**

ANCHOR BOLT ANALYSIS

URS

Job	180' Rohn SSV - Ellington, CT	Project No.	VZ1-201	Page	of
Description	Anchor Bolt Analysis	Computed by	JEK	Sheet 1	of 3
	Burbank Road	Checked by		Date 07/31/06	
				Date	

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	Uplift := 173·kips	*user input*	
Shear:	Shear := 22·kips	*user input*	
Compression:	Compression := 200·kips	*user input*	

Anchor Bolt Data:

Use ASTM A354 Grade BC

Number of Anchor Bolts = N	N := 10	*user input*	
Bolt Ultimate Strength:	F_u := 125·ksi	*user input*	
Bolt Yield Strength:	Fy := 109·ksi	*user input*	
Bolt Modulus:	E := 29000·ksi	*user input*	
Thickness of Anchor Bolts	D := 1 in	*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:

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

Net Area of Bolt:

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

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$AllowableTension := 1.33\cdot\left(0.33\cdot A_g\cdot F_u\right) \qquad AllowableTension = 43.1\,kips$$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{net.area} := 1.33\cdot\left(0.60\cdot A_n\cdot Fy\right) \qquad F_{net.area} = 52.7\,kips$$

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 17.3\,kips$$

Check Stresses:

$$\frac{MaxTension}{AllowableTension} = 0.40$$

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

Condition1 = "OK"

Check Anchor Bolt Area:

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

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 2.0\ in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 0.7\ in^2$$

Provided Area:

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

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.3$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.1$$

Condition3 = "OK"

FOUNDATION ANALYSIS

URS

Job	180' Self-Support Lattice - Ellington, CT	Project No.	VZ1-201	Page	of
Description	Foundation Analysis	Computed by	JEK	Sheet 1	of 2
	Burbank Road	Checked by		Date	07/31/06

Foundation Analysis

INPUT DATA

Max Pier Reactions:

Compression: $Fc := 200k$

Uplift: $Fu := 173k$

Shear: $Fs := 22k$

Structure:

Footing Diameter:: $B_{ftg} := 6ft$

Footing Length: $L_{ftg} := 6.5ft$

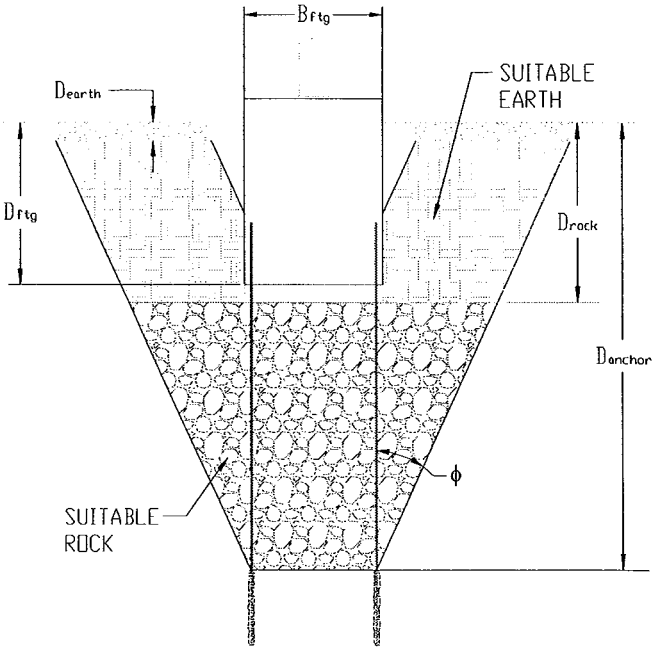
Depths:

Depth to Bottom of Footing: (from grade line) $D_{ftg} := 0ft$

Depth to Suitable Rock: (from grade line) $D_{rock} := 0ft$

Depth to Suitable Earth: (from grade line) $D_{earth} := 0ft$

Anchor Depth: $D_{anchor} := 19ft$



Soil Properties:

Internal Friction Angle: $\phi := 38deg$

Unit Weight of Earth: $\gamma_{earth} := 100\frac{lb}{ft^3}$

Unit Weight of Rock: $\gamma_{rock} := 150\frac{lb}{ft^3}$

Unit Weight of Concrete: $\gamma_{conc} := 150\frac{lb}{ft^3}$

Anchors:

Number of Anchors: $N_{anchor} := 16$

Anchor Spacing: $S_{anchor} := 4.25ft$

Hole Diameter: $hole_d := 4in$

Bond Strength: $\sigma_{bond} := 100psi$

Design Force: (per anchor) $P_{design} := 21kips$

URS

Job	180' Self-Support Lattice - Ellington, CT	Project No.	VZ1-201	Page	of
Description	Foundation Analysis	Computed by	JEK	Sheet 2	of 2
	Burbank Road	Checked by		Date 07/31/06	
				Date	

Resisting Forces:

Tension per Anchor: $Ta := \frac{Fu}{N_{anchor}}$ — Ta = 10.8 k

Shear per Anchor: $Sa := \frac{Fs}{N_{anchor}}$ — Sa = 1.4 k

Height of Soil: $h1 := D_{ftg}$ — h1 = 0.0

Height of Rock: $h2 := .75(D_{anchor} - D_{rock})$ — h2 = 14.2 ft

Height of Cone Beyond Rock: $h3 := \frac{S_{anchor}}{2 \cdot \tan(\phi)}$ — h3 = 2.7 ft

Volume of Concrete: $Vc := 3.14\left(\frac{B_{ftg}}{2}\right)^2 \cdot L_{ftg}$ — $Vc = 183.7\ ft^3$

Weight of Concrete: $Wc := Vc \cdot \gamma_{conc}$ — Wc = 27.6 k

Volume of Soil: $Vs := 3.14[(h2 + h3) \cdot \tan(\phi)]^2 \cdot h1$ — Vs = 0.0

Weight of Soil: $Ws := Vs \cdot \gamma_{earth}$ — Ws = 0.0 k

Volume of Rock: $Vr := \left[\frac{1}{3} \cdot 3.14[(h2 + h3) \cdot \tan(\phi)]^2 \cdot (h2 + h3)\right] - \left[\frac{1}{3} \cdot 3.14(h3 \cdot \tan(\phi))^2 \cdot h3\right]$ — $Vr = 3109.4\ ft^3$

Weight of Rock: $Wr := Vr \cdot \gamma_{rock}$ — Wr = 466.4 k

Total Weight: $Wt := Ws + Wr + Wc$ — Wt = 494.0 k

Factor of Safety for Uplift: $FSuplift := \frac{Wt}{Fu}$ — FSuplift = 2.9

$Condition1 := if(FSuplift \geq 2.00, "OK", "Overstressed")$ — Condition1 = "OK"

Embedment Length:

Required Embedment: $L_b := \frac{P_{design}}{\pi \cdot hole_d \cdot \sigma_{bond}}$ — $L_b = 1.4$ ft

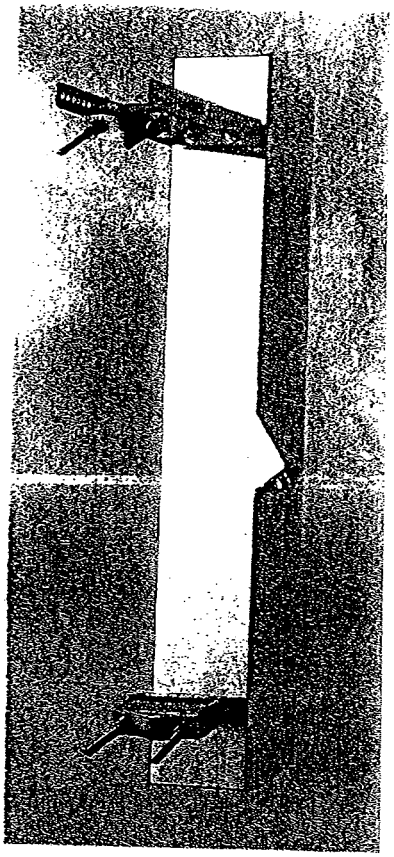
$Condition2 := if[(D_{anchor} - D_{rock}) \geq L_b, "OK", "Overstressed"]$ — Condition2 = "OK"

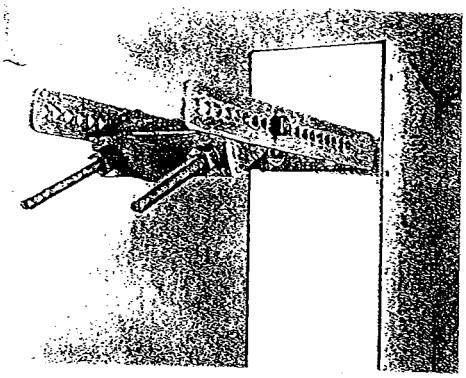
ALP-E 9011-Din

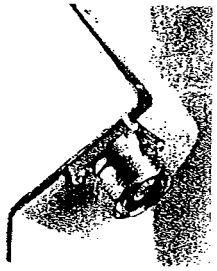
Enhanced Log-Periodic Antenna

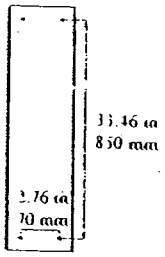
Features:

- ❑ Small Size
- ❑ Aesthetically Pleasing
- ❑ Suitable For TDMA/CDMA
- ❑ High Return Loss
- ❑ Low Intermodulation
- ❑ High FTB
- ❑ Broadbanded
- ❑ Side-lobe Suppression
- ❑ Sturdy Design
- ❑ Down-Tilt Brackets Incl.









The distance between the center of the bolts (on the back of the antenna) are shown in the drawing above.

Bolt diameter is: 3/8-16 (comes with lock nut).

Frequency Range:	800-900 MHz
Impedance:	50 ohm
Connector Type:	7/16 Din
Return Loss:	20 dB
Polarization:	Vertical
Gain:	> 11 dBd
Front To Back Ratio:	> 30 dB
Side-Lobe Suppression:	18 dB
Intermodulation (2x25W):	IM3 > 146 dB
	IM5 > 153 dB
	IM7/9 > 163 dB
Power Rating:	500 W
H-Plane (-3 dB point):	85 - 92°
V-Plane (-3 dB point):	16 - 18°
Lightning Protection:	DC Grounded

Overall Height:	43 in	[1092 mm]
Width:	6.5 in	[165 mm]
Depth:	8 in	[203 mm]
Weight Including Tilt-Brackets:	20 lbs	[9.1 Kg]
Rated Wind Velocity:	113 mph	[180 Km/h]
Wind Area (CxA/Side):	2.3 sq. ft.	[0.22 sq.m]
Lateral Thrust At Rated Wind Worst Case:	112 lbs	[500 N]

Radiating Elements:	Aluminum
Extrusion:	Aluminum
Radome:	Grey PVC
Tilt-Bracket:	Hot Dip Galvanized Steel
Antenna Bolts:	Stainless Steel

The ALP-E 9011-Din is made in U.S.A.

Vertically Polarized, Log Periodic 80° / 16 dBi

LPA-185080/8CF ___

When ordering, replace "___" with connector type.

Mechanical specifications

Length	1204 mm	47.4 in
Width	104 mm	4.1 in
Depth	150 mm	5.9 in
[4] Weight	3.2 kg	7.0 lbs
Wind Area		
Front	0.125 m^2	1.35 ft^2
Side	0.144 m^2	1.55 ft^2
Rated Wind Velocity (Safety factor 2.0)		
	>658 km/hr	>409 mph
Wind load @ 100 mph (161 km/hr)		
Front	202 N	45 lbs
Side	270 N	60.8 lbs

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

Mounting & Downtilting:

Wall mounted or pole tower mount with mounting brackets

Mounting bracket kit #26799997

Downtilt bracket kit #26799999
The downtilt bracket kit includes the mounting bracket kit.

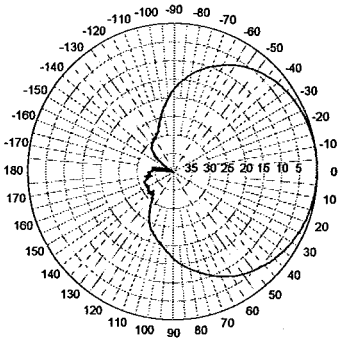
Electrical specifications

Frequency Range	1850-1990 MHz
Impedance	50Ω
[3] Connector	NE, E-DIN
[1] VSWR	≤1.4:1
Polarization	Vertical
[1] Gain	16 dBi
[2] Power Rating	250 W
[1] Half Power Angle	
H-Plane	80°
E-Plane	8°
[1] Electrical Downtilt	0°
[1] Null Fill	10%
Lightning Protection	Direct Ground

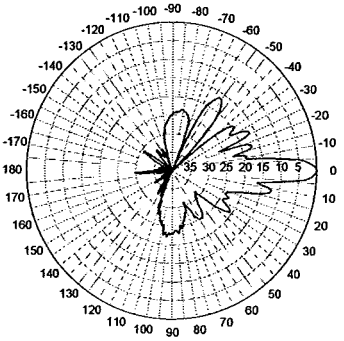
[1] Typical Values
[2] Power Rating limited by connector only
[3] NE indicates an elongated N Connector
E-DIN indicates an elongated DIN Connector
[4] The antenna weight listed above does not include the bracket weight.

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

Radiation-pattern[1)]



Horizontal



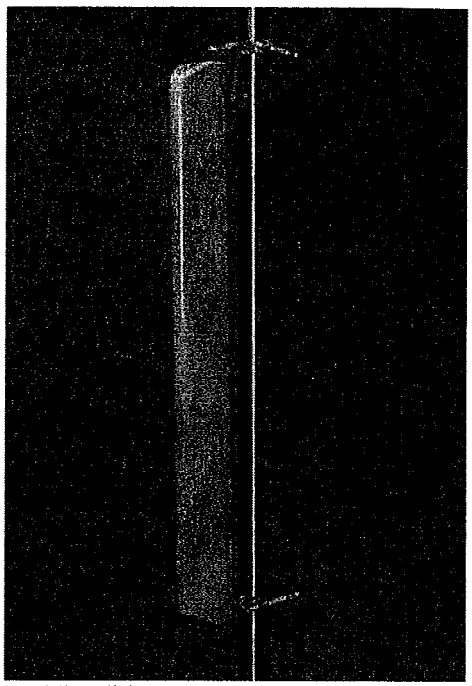
Vertical

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

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

CF Denotes a Center-Fed Connector.

1850-1990 MHz



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

- True log-periodic design allows for superior front-to-side characteristics to minimize sector overlap.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

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

Antenna available with center-fed connector only.

Amphenol Antel, Inc.
The Antenna Technology Company

1300 Capital Drive Rockford, IL 61109 Toll-Free (888) 417-9562 Tel. (815) 399-0001
Fax: (815) 399-0156 Email: antel@antelinc.com www.antelinc.com

Revision Date: 9/21/04

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF 176' MONOPOLE FOR NEW ANTENNA ARRANGEMENT

60 Industrial Park
Vernon, Connecticut

prepared for

verizon wireless

Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

URS

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

36931024.00008
VZ1-199

July 27, 2006

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the 176' monopole located at 60 Industrial Park in Vernon, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code and the TIA/EIA-222-F standard for a wind velocity of 80 mph (fastest mile) and 69 mph (fastest mile) concurrent with ½" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report. The proposed Verizon Wireless modification is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove: **(6) existing Swedcom ALP-E-9011 antennas** **Install:** **(6) Antel LPA-185090-8CF_2 antennas on existing low profile platform with (6) existing 1 5/8" coax cables**	**Verizon (Proposed)**	**@ 155'**

The results of the analysis indicate that the existing tower structure is in compliance with the proposed loading conditions. **The tower and foundation are considered structurally adequate under the wind load specified above and the existing, future, and proposed antenna loadings.**

This analysis is based on:

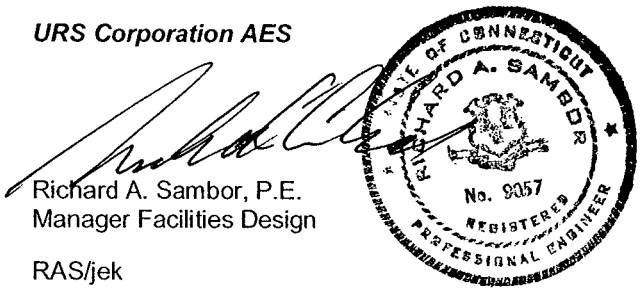
1) The tower structure's theoretical capacity not including any assessment of the condition of the tower.
2) Tower geometry, member sizes and foundation taken from Tower and Foundation reports prepared by PiROD, Inc. Engineering File No. A-116329 dated January 28, 2000.
3) Antenna and mount configuration as specified on the following page of this report.

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 AES



Richard A. Sambor, P.E.
Manager Facilities Design

RAS/jek

cc: DR, AA, IA, CF/Book – URS

2. INTRODUCTION

The subject tower is located at 60 Industrial Park in Vernon, Connecticut. The structure is a 176' monopole manufactured by PiROD Incorporated.

The tower geometry and structure member sizes were taken from the original construction drawings (PiROD Eng. File #: A-116329) prepared by PiROD Inc., dated January 28, 2000.

The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Centerline Elevation*	*Cable*
(6) EMS RR90-17-02DP antennas	T-Mobile (existing)	Low Profile Platform	173'	(12) 1 5/8" coax cables (within monopole)
(3) Allgon 7250.03 antennas	Cingular Blue (existing)	Flush Mounts	165'	(6) 1 5/8" coax cables (within monopole)
(6) Decibel DB948F85T2E-M antennas	Verizon (existing)	Low Profile Platform	155'	(6) 1 5/8" coax cables (within monopole)
(6) Antel WPA-80090/4CF antennas	**Verizon (proposed)**	Low Profile Platform (listed above)	**155'**	(6) 1 5/8" coax cables (within monopole)
(12) Decibel DB844H90 antennas	Nextel (existing)	Low Profile Platform	145'	(12) 1 5/8" coax cables (within monopole)

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 existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with the 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 analysis was conducted using RISA Tower 4.5. 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 (without ice) + Tower Dead Load
Load Condition 2 = 69 mph (fastest mile Wind Load (with ice) + Ice Load + Tower Dead Load

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

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

4. FINDINGS AND EVALUATION

Combined axial and bending stresses on the monopole structure were evaluated to compare with allowable stresses in accordance with AISC. The calculated stresses under the proposed loading were below the allowable stresses. Detailed analysis and calculations for the proposed load condition are provided in section 6 of this report. Additionally, the anchor bolts, base plate, and foundation were found to be structurally adequate.

5. CONCLUSIONS

The results of the analysis indicate that the tower structure is in compliance with the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the TIA/EIA-222-F wind load classification specified above and all the existing and proposed antenna loading.**

Limitations/Assumptions:

This report is based on the following:

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

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.

Ongoing and Periodic Inspection and Maintenance:

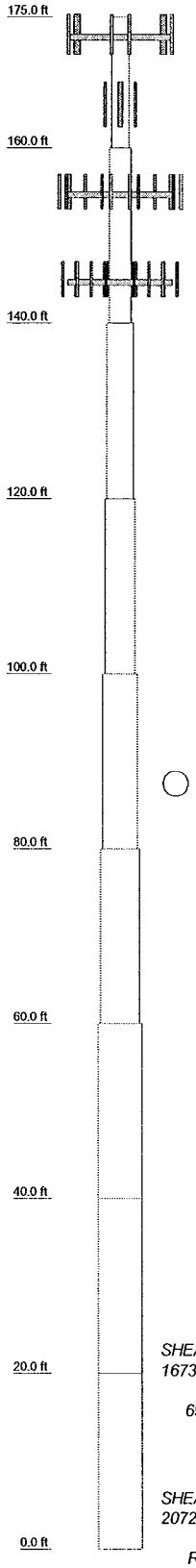
After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

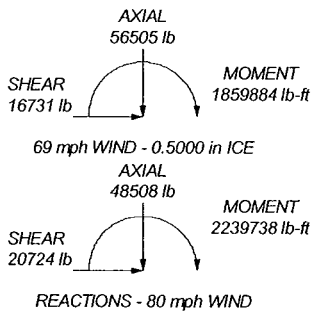
The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire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

6. DRAWINGS AND DATA

RISA TOWER INPUT / OUTPUT SUMMARY

Section	Size	Length (ft)	Grade	Weight (lb)
1	P24x3/8	15.00	A53-B-42	1420.6
2	P30x3/8	20.00		2375.2
3	P36x3/8	20.00		2856.3
4	P42x3/8	20.00		3337.3
5	P48x3/8	20.00		3818.4
	P54x3/8	20.00		4299.4
7	P60x3/8	20.00		4780.5
8	P60x1/2	20.00		6360.6
9	P60x5/8	20.00		7934.1
				37182.5





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) RR90-17-02DP (T-Mobile)	173	DB948F85T2E-M (Verizon)	155
(2) RR90-17-02DP (T-Mobile)	173	WPA-80090/4CF (Verizon)	155
(2) RR90-17-02DP (T-Mobile)	173	DB948F85T2E-M (Verizon)	155
Low Profile Platform (T-Mobile)	173	WPA-80090/4CF (Verizon)	155
7250.03 w/Mount Pipe (Cingular Blue)	165	DB948F85T2E-M (Verizon)	155
7250.03 w/Mount Pipe (Cingular Blue)	165	WPA-80090/4CF (Verizon)	155
7250.03 w/Mount Pipe (Cingular Blue)	165	PiROD 15' Low Profile Platform (Verizon)	155
DB948F85T2E-M (Verizon)	155	PiROD 15' Low Profile Platform (Nextel)	145
WPA-80090/4CF (Verizon)	155	(4) DB844H90 (Nextel)	145
DB948F85T2E-M (Verizon)	155	(4) DB844H90 (Nextel)	145
WPA-80090/4CF (Verizon)	155	(4) DB844H90 (Nextel)	145
DB948F85T2E-M (Verizon)	155		
WPA-80090/4CF (Verizon)	155		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 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 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 63.2%

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

Job: *176' Monopole*			
Project: *60 Industrial Park Vernon, CT*			
Client: Verizon Wireless	Drawn by: Staff	App'd:	
Code: TIA/EIA-222-F	Date: 07/27/06	Scale: NTS	
Path: P:\08\ERIFiles\176' Monopole.eri		Dwg No. E-1	

RISA TOWER DETAILED OUTPUT

RISATower	Job	Page
	176' Monopole	1 of 25
URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Project 60 Industrial Park Vernon, CT	Date 12:13:38 07/27/06
	Client Verizon Wireless	Designed by Staff

Tower Input Data

There is a pole section.
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 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	175.00-160.00	15.00	P24x3/8	A53-B-42 (42 ksi)	
L2	160.00-140.00	20.00	P30x3/8	A53-B-42 (42 ksi)	
L3	140.00-120.00	20.00	P36x3/8	A53-B-42 (42 ksi)	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L4	120.00-100.00	20.00	P42x3/8	A53-B-42 (42 ksi)	
L5	100.00-80.00	20.00	P48x3/8	A53-B-42 (42 ksi)	
L6	80.00-60.00	20.00	P54x3/8	A53-B-42 (42 ksi)	
L7	60.00-40.00	20.00	P60x3/8	A53-B-42 (42 ksi)	
L8	40.00-20.00	20.00	P60x1/2	A53-B-42 (42 ksi)	
L9	20.00-0.00	20.00	P60x5/8	A53-B-42 (42 ksi)	

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 175.00-160.00				1	1	1		
L2 160.00-140.00				1	1	1		
L3 140.00-120.00				1	1	1		
L4 120.00-100.00				1	1	1		
L5 100.00-80.00				1	1	1		
L6 80.00-60.00				1	1	1		
L7 60.00-40.00				1	1	1		
L8 40.00-20.00				1	1	1		
L9 20.00-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 5/8 (Cingular Blue)	C	No	Inside Pole	165.00 - 9.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (T-Mobile)	C	No	Inside Pole	175.00 - 2.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Nextel)	C	No	Inside Pole	124.00 - 9.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Verizon)	C	No	Inside Pole	155.00 - 9.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Nextel)	A	No	CaAa (Out Of Face)	145.00 - 124.00	1	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (Nextel)	B	No	CaAa (Out Of Face)	145.00 - 124.00	1	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (Nextel)	C	No	CaAa (Out Of Face)	145.00 - 124.00	1	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (Nextel)	A	No	CaAa (Out Of Face)	145.00 - 124.00	3	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55
1 5/8	B	No	CaAa (Out Of	145.00 - 124.00	3	No Ice	0.00	1.04

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
(Nextel)			Face)			1/2" Ice	0.00	2.55
1 5/8	C	No	CaAa (Out Of	145.00 - 124.00	3	No Ice	0.00	1.04
(Nextel)			Face)			1/2" Ice	0.00	2.55

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 lb
L1	175.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	218.40
L2	160.00-140.00	A	0.000	0.000	0.000	0.990	20.80
		B	0.000	0.000	0.000	0.990	20.80
		C	0.000	0.000	0.000	0.990	582.40
L3	140.00-120.00	A	0.000	0.000	0.000	3.168	66.56
		B	0.000	0.000	0.000	3.168	66.56
		C	0.000	0.000	0.000	3.168	740.48
L4	120.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	873.60
L5	100.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	873.60
L6	80.00-60.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	873.60
L7	60.00-40.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	873.60
L8	40.00-20.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	873.60
L9	20.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	567.84

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 lb
L1	175.00-160.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	218.40
L2	160.00-140.00	A	0.500	0.000	0.000	0.000	1.490	51.00
		B		0.000	0.000	0.000	1.490	51.00
		C		0.000	0.000	0.000	1.490	612.60
L3	140.00-120.00	A	0.500	0.000	0.000	0.000	4.768	163.20
		B		0.000	0.000	0.000	4.768	163.20
		C		0.000	0.000	0.000	4.768	837.12
L4	120.00-100.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	873.60
L5	100.00-80.00	A	0.500	0.000	0.000	0.000	0.000	0.00

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 lb
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	873.60
L6	80.00-60.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	873.60
L7	60.00-40.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	873.60
L8	40.00-20.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	873.60
L9	20.00-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	567.84

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	175.00-160.00	0.0000	0.0000	0.0000	0.0000
L2	160.00-140.00	0.0000	0.0000	0.0000	0.0000
L3	140.00-120.00	0.0000	0.0000	0.0000	0.0000
L4	120.00-100.00	0.0000	0.0000	0.0000	0.0000
L5	100.00-80.00	0.0000	0.0000	0.0000	0.0000
L6	80.00-60.00	0.0000	0.0000	0.0000	0.0000
L7	60.00-40.00	0.0000	0.0000	0.0000	0.0000
L8	40.00-20.00	0.0000	0.0000	0.0000	0.0000
L9	20.00-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(2) RR90-17-02DP	A	From Leg	3.00	0.0000	173.00	No Ice	4.36	1.97	18.00
(T-Mobile)			0.00			1/2" Ice	4.77	2.31	40.42
			0.00						
(2) RR90-17-02DP	B	From Leg	3.00	0.0000	173.00	No Ice	4.36	1.97	18.00
(T-Mobile)			0.00			1/2" Ice	4.77	2.31	40.42
			0.00						
(2) RR90-17-02DP	C	From Leg	3.00	0.0000	173.00	No Ice	4.36	1.97	18.00
(T-Mobile)			0.00			1/2" Ice	4.77	2.31	40.42
			0.00						
Low Profile Platform	C	None		0.0000	173.00	No Ice	8.00	8.00	1200.00
(T-Mobile)						1/2" Ice	9.00	9.00	1900.00
(4) DB844H90	A	From Leg	3.50	0.0000	145.00	No Ice	2.87	3.97	10.00
(Nextel)			0.00			1/2" Ice	3.18	4.34	36.27

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 lb
			0.00						
(4) DB844H90	B	From Leg	3.50	0.0000	145.00	No Ice	2.87	3.97	10.00
(Nextel)			0.00			1/2" Ice	3.18	4.34	36.27
			0.00						
(4) DB844H90	C	From Leg	3.50	0.0000	145.00	No Ice	2.87	3.97	10.00
(Nextel)			0.00			1/2" Ice	3.18	4.34	36.27
			0.00						
PiROD 15' Low Profile Platform (Nextel)	C	None		0.0000	145.00	No Ice	17.30	17.30	1500.00
						1/2" Ice	22.10	22.10	2030.00
DB948F85T2E-M	A	From Leg	3.50	0.0000	155.00	No Ice	1.92	3.26	8.50
(Verizon)			4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
WPA-80090/4CF	A	From Leg	3.50	0.0000	155.00	No Ice	3.73	2.71	12.00
(Verizon)			6.00			1/2" Ice	4.10	3.01	36.71
			0.00						
DB948F85T2E-M	A	From Leg	3.50	0.0000	155.00	No Ice	1.92	3.26	8.50
(Verizon)			-4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
WPA-80090/4CF	A	From Leg	3.50	0.0000	155.00	No Ice	3.73	2.71	12.00
(Verizon)			-6.00			1/2" Ice	4.10	3.01	36.71
			0.00						
DB948F85T2E-M	B	From Leg	3.50	0.0000	155.00	No Ice	1.92	3.26	8.50
(Verizon)			4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
WPA-80090/4CF	B	From Leg	3.50	0.0000	155.00	No Ice	3.73	2.71	12.00
(Verizon)			6.00			1/2" Ice	4.10	3.01	36.71
			0.00						
DB948F85T2E-M	B	From Leg	3.50	0.0000	155.00	No Ice	1.92	3.26	8.50
(Verizon)			-4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
WPA-80090/4CF	B	From Leg	3.50	0.0000	155.00	No Ice	3.73	2.71	12.00
(Verizon)			-6.00			1/2" Ice	4.10	3.01	36.71
			0.00						
DB948F85T2E-M	C	From Leg	3.50	0.0000	155.00	No Ice	1.92	3.26	8.50
(Verizon)			4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
WPA-80090/4CF	C	From Leg	3.50	0.0000	155.00	No Ice	3.73	2.71	12.00
(Verizon)			6.00			1/2" Ice	4.10	3.01	36.71
			0.00						
DB948F85T2E-M	C	From Leg	3.50	0.0000	155.00	No Ice	1.92	3.26	8.50
(Verizon)			-4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
WPA-80090/4CF	C	From Leg	3.50	0.0000	155.00	No Ice	3.73	2.71	12.00
(Verizon)			-6.00			1/2" Ice	4.10	3.01	36.71
			0.00						
PiROD 15' Low Profile Platform (Verizon)	C	None		0.0000	155.00	No Ice	17.30	17.30	1500.00
						1/2" Ice	22.10	22.10	2030.00
7250.03 w/Mount Pipe	A	From Leg	1.00	0.0000	165.00	No Ice	4.45	3.54	40.95
(Cingular Blue)			0.00			1/2" Ice	5.03	4.72	76.25
			0.00						
7250.03 w/Mount Pipe	B	From Leg	1.00	0.0000	165.00	No Ice	4.45	3.54	40.95
(Cingular Blue)			0.00			1/2" Ice	5.03	4.72	76.25
			0.00						
7250.03 w/Mount Pipe	C	From Leg	1.00	0.0000	165.00	No Ice	4.45	3.54	40.95
(Cingular Blue)			0.00			1/2" Ice	5.03	4.72	76.25

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C_AA_A Front	C_AA_A Side	Weight
			ft ft ft	°	ft	ft^2	ft^2	lb
			0.00					

Tower Pressures - No Ice

$G_H = 1.690$

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
L1 175.00-160.00	167.50	1.591	26	30.000	A	0.000	30.000	30.000	100.00	0.000	0.000
					B	0.000	30.000		100.00		
					C	0.000	30.000		100.00		
L2 160.00-140.00	150.00	1.541	25	50.000	A	0.000	50.000	50.000	100.00	0.000	2.970
					B	0.000	50.000		100.00		
					C	0.000	50.000		100.00		
L3 140.00-120.00	130.00	1.48	24	60.000	A	0.000	60.000	60.000	100.00	0.000	9.504
					B	0.000	60.000		100.00		
					C	0.000	60.000		100.00		
L4 120.00-100.00	110.00	1.411	23	70.000	A	0.000	70.000	70.000	100.00	0.000	0.000
					B	0.000	70.000		100.00		
					C	0.000	70.000		100.00		
L5 100.00-80.00	90.00	1.332	22	80.000	A	0.000	80.000	80.000	100.00	0.000	0.000
					B	0.000	80.000		100.00		
					C	0.000	80.000		100.00		
L6 80.00-60.00	70.00	1.24	20	90.000	A	0.000	90.000	90.000	100.00	0.000	0.000
					B	0.000	90.000		100.00		
					C	0.000	90.000		100.00		
L7 60.00-40.00	50.00	1.126	18	100.000	A	0.000	100.000	100.000	100.00	0.000	0.000
					B	0.000	100.000		100.00		
					C	0.000	100.000		100.00		
L8 40.00-20.00	30.00	1	16	100.000	A	0.000	100.000	100.000	100.00	0.000	0.000
					B	0.000	100.000		100.00		
					C	0.000	100.000		100.00		
L9 20.00-0.00	10.00	1	16	100.000	A	0.000	100.000	100.000	100.00	0.000	0.000
					B	0.000	100.000		100.00		
					C	0.000	100.000		100.00		

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation	z	K_Z	q_z	t_Z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
L1 175.00-	167.50	1.591	20	0.5000	31.250	A	0.000	31.250	31.250	100.00	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
160.00						B	0.000	31.250		100.00		
						C	0.000	31.250		100.00		
L2 160.00-140.00	150.00	1.541	19	0.5000	51.667	A	0.000	51.667	51.667	100.00	0.000	4.470
						B	0.000	51.667		100.00		
						C	0.000	51.667		100.00		
L3 140.00-120.00	130.00	1.48	18	0.5000	61.667	A	0.000	61.667	61.667	100.00	0.000	14.304
						B	0.000	61.667		100.00		
						C	0.000	61.667		100.00		
L4 120.00-100.00	110.00	1.411	17	0.5000	71.667	A	0.000	71.667	71.667	100.00	0.000	0.000
						B	0.000	71.667		100.00		
						C	0.000	71.667		100.00		
L5 100.00-80.00	90.00	1.332	16	0.5000	81.667	A	0.000	81.667	81.667	100.00	0.000	0.000
						B	0.000	81.667		100.00		
						C	0.000	81.667		100.00		
L6 80.00-60.00	70.00	1.24	15	0.5000	91.667	A	0.000	91.667	91.667	100.00	0.000	0.000
						B	0.000	91.667		100.00		
						C	0.000	91.667		100.00		
L7 60.00-40.00	50.00	1.126	14	0.5000	101.667	A	0.000	101.667	101.667	100.00	0.000	0.000
						B	0.000	101.667		100.00		
						C	0.000	101.667		100.00		
L8 40.00-20.00	30.00	1	12	0.5000	101.667	A	0.000	101.667	101.667	100.00	0.000	0.000
						B	0.000	101.667		100.00		
						C	0.000	101.667		100.00		
L9 20.00-0.00	10.00	1	12	0.5000	101.667	A	0.000	101.667	101.667	100.00	0.000	0.000
						B	0.000	101.667		100.00		
						C	0.000	101.667		100.00		

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 175.00-160.00	167.50	1.591	10	30.000	A	0.000	30.000	30.000	100.00	0.000	0.000
					B	0.000	30.000		100.00		
					C	0.000	30.000		100.00		
L2 160.00-140.00	150.00	1.541	10	50.000	A	0.000	50.000	50.000	100.00	0.000	2.970
					B	0.000	50.000		100.00		
					C	0.000	50.000		100.00		
L3 140.00-120.00	130.00	1.48	9	60.000	A	0.000	60.000	60.000	100.00	0.000	9.504
					B	0.000	60.000		100.00		
					C	0.000	60.000		100.00		
L4 120.00-100.00	110.00	1.411	9	70.000	A	0.000	70.000	70.000	100.00	0.000	0.000
					B	0.000	70.000		100.00		
					C	0.000	70.000		100.00		
L5 100.00-80.00	90.00	1.332	9	80.000	A	0.000	80.000	80.000	100.00	0.000	0.000
					B	0.000	80.000		100.00		
					C	0.000	80.000		100.00		
L6 80.00-60.00	70.00	1.24	8	90.000	A	0.000	90.000	90.000	100.00	0.000	0.000
					B	0.000	90.000		100.00		
					C	0.000	90.000		100.00		
L7 60.00-40.00	50.00	1.126	7	100.000	A	0.000	100.000	100.000	100.00	0.000	0.000
					B	0.000	100.000		100.00		

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
					C	0.000	100.000		100.00		
L8 40.00-20.00	30.00	1	6	100.000	A	0.000	100.000	100.000	100.00	0.000	0.000
					B	0.000	100.000		100.00		
					C	0.000	100.000		100.00		
L9 20.00-0.00	10.00	1	6	100.000	A	0.000	100.000	100.000	100.00	0.000	0.000
					B	0.000	100.000		100.00		
					C	0.000	100.000		100.00		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 175.00-160.00	218.40	1420.62	A	1	0.59	1	1	1	30.000	779.56	51.97	C
			B	1	0.59	1	1	1	30.000			
			C	1	0.59	1	1	1	30.000			
L2 160.00-140.00	624.00	2375.22	A	1	0.59	1	1	1	50.000	1385.70	69.28	C
			B	1	0.59	1	1	1	50.000			
			C	1	0.59	1	1	1	50.000			
L3 140.00-120.00	873.60	2856.27	A	1	0.59	1	1	1	60.000	1839.56	91.98	C
			B	1	0.59	1	1	1	60.000			
			C	1	0.59	1	1	1	60.000			
L4 120.00-100.00	873.60	3337.33	A	1	0.59	1	1	1	70.000	1613.06	80.65	C
			B	1	0.59	1	1	1	70.000			
			C	1	0.59	1	1	1	70.000			
L5 100.00-80.00	873.60	3818.38	A	1	0.59	1	1	1	80.000	1740.77	87.04	C
			B	1	0.59	1	1	1	80.000			
			C	1	0.59	1	1	1	80.000			
L6 80.00-60.00	873.60	4299.44	A	1	0.59	1	1	1	90.000	1822.68	91.13	C
			B	1	0.59	1	1	1	90.000			
			C	1	0.59	1	1	1	90.000			
L7 60.00-40.00	873.60	4780.50	A	1	0.59	1	1	1	100.000	1839.58	91.98	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L8 40.00-20.00	873.60	6360.63	A	1	0.59	1	1	1	100.000	1633.65	81.68	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L9 20.00-0.00	567.84	7934.09	A	1	0.59	1	1	1	100.000	1633.65	81.68	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
Sum Weight:	6651.84	37182.48						OTM	1196593.2 lb-ft	14288.21		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 175.00-160.00	218.40	1420.62	A	1	0.59	1	1	1	30.000	779.56	51.97	C
			B	1	0.59	1	1	1	30.000			
			C	1	0.59	1	1	1	30.000			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L2 160.00-140.00	624.00	2375.22	A	1	0.59	1	1	1	50.000	1385.70	69.28	C
			B	1	0.59	1	1	1	50.000			
			C	1	0.59	1	1	1	50.000			
L3 140.00-120.00	873.60	2856.27	A	1	0.59	1	1	1	60.000	1839.56	91.98	C
			B	1	0.59	1	1	1	60.000			
			C	1	0.59	1	1	1	60.000			
L4 120.00-100.00	873.60	3337.33	A	1	0.59	1	1	1	70.000	1613.06	80.65	C
			B	1	0.59	1	1	1	70.000			
			C	1	0.59	1	1	1	70.000			
L5 100.00-80.00	873.60	3818.38	A	1	0.59	1	1	1	80.000	1740.77	87.04	C
			B	1	0.59	1	1	1	80.000			
			C	1	0.59	1	1	1	80.000			
L6 80.00-60.00	873.60	4299.44	A	1	0.59	1	1	1	90.000	1822.68	91.13	C
			B	1	0.59	1	1	1	90.000			
			C	1	0.59	1	1	1	90.000			
L7 60.00-40.00	873.60	4780.50	A	1	0.59	1	1	1	100.000	1839.58	91.98	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L8 40.00-20.00	873.60	6360.63	A	1	0.59	1	1	1	100.000	1633.65	81.68	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L9 20.00-0.00	567.84	7934.09	A	1	0.59	1	1	1	100.000	1633.65	81.68	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
Sum Weight:	6651.84	37182.48						OTM	1196593.2 2 lb-ft	14288.21		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 175.00-160.00	218.40	1420.62	A	1	0.59	1	1	1	30.000	779.56	51.97	C
			B	1	0.59	1	1	1	30.000			
			C	1	0.59	1	1	1	30.000			
L2 160.00-140.00	624.00	2375.22	A	1	0.59	1	1	1	50.000	1385.70	69.28	C
			B	1	0.59	1	1	1	50.000			
			C	1	0.59	1	1	1	50.000			
L3 140.00-120.00	873.60	2856.27	A	1	0.59	1	1	1	60.000	1839.56	91.98	C
			B	1	0.59	1	1	1	60.000			
			C	1	0.59	1	1	1	60.000			
L4 120.00-100.00	873.60	3337.33	A	1	0.59	1	1	1	70.000	1613.06	80.65	C
			B	1	0.59	1	1	1	70.000			
			C	1	0.59	1	1	1	70.000			
L5 100.00-80.00	873.60	3818.38	A	1	0.59	1	1	1	80.000	1740.77	87.04	C
			B	1	0.59	1	1	1	80.000			
			C	1	0.59	1	1	1	80.000			
L6 80.00-60.00	873.60	4299.44	A	1	0.59	1	1	1	90.000	1822.68	91.13	C
			B	1	0.59	1	1	1	90.000			
			C	1	0.59	1	1	1	90.000			
L7 60.00-40.00	873.60	4780.50	A	1	0.59	1	1	1	100.000	1839.58	91.98	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L8 40.00-20.00	873.60	6360.63	A	1	0.59	1	1	1	100.000	1633.65	81.68	C
			B	1	0.59	1	1	1	100.000			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	1	0.59	1	1	1	100.000			
L9 20.00-0.00	567.84	7934.09	A	1	0.59	1	1	1	100.000	1633.65	81.68	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
Sum Weight:	6651.84	37182.48						OTM	1196593.2 2 lb-ft	14288.21		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 175.00-160.00	218.40	1420.62	A	1	0.59	1	1	1	30.000	779.56	51.97	C
			B	1	0.59	1	1	1	30.000			
			C	1	0.59	1	1	1	30.000			
L2 160.00-140.00	624.00	2375.22	A	1	0.59	1	1	1	50.000	1385.70	69.28	C
			B	1	0.59	1	1	1	50.000			
			C	1	0.59	1	1	1	50.000			
L3 140.00-120.00	873.60	2856.27	A	1	0.59	1	1	1	60.000	1839.56	91.98	C
			B	1	0.59	1	1	1	60.000			
			C	1	0.59	1	1	1	60.000			
L4 120.00-100.00	873.60	3337.33	A	1	0.59	1	1	1	70.000	1613.06	80.65	C
			B	1	0.59	1	1	1	70.000			
			C	1	0.59	1	1	1	70.000			
L5 100.00-80.00	873.60	3818.38	A	1	0.59	1	1	1	80.000	1740.77	87.04	C
			B	1	0.59	1	1	1	80.000			
			C	1	0.59	1	1	1	80.000			
L6 80.00-60.00	873.60	4299.44	A	1	0.59	1	1	1	90.000	1822.68	91.13	C
			B	1	0.59	1	1	1	90.000			
			C	1	0.59	1	1	1	90.000			
L7 60.00-40.00	873.60	4780.50	A	1	0.59	1	1	1	100.000	1839.58	91.98	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L8 40.00-20.00	873.60	6360.63	A	1	0.59	1	1	1	100.000	1633.65	81.68	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L9 20.00-0.00	567.84	7934.09	A	1	0.59	1	1	1	100.000	1633.65	81.68	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
Sum Weight:	6651.84	37182.48						OTM	1196593.2 2 lb-ft	14288.21		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 175.00-160.00	218.40	1645.11	A	1	0.59	1	1	1	31.250	609.03	40.60	C
			B	1	0.59	1	1	1	31.250			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	1	0.59	1	1	1	31.250			
L2 160.00-140.00	714.60	2747.84	A	1	0.59	1	1	1	51.667	1118.75	55.94	C
			B	1	0.59	1	1	1	51.667			
			C	1	0.59	1	1	1	51.667			
L3 140.00-120.00	1163.52	3302.20	A	1	0.59	1	1	1	61.667	1557.36	77.87	C
			B	1	0.59	1	1	1	61.667			
			C	1	0.59	1	1	1	61.667			
L4 120.00-100.00	873.60	3856.56	A	1	0.59	1	1	1	71.667	1238.60	61.93	C
			B	1	0.59	1	1	1	71.667			
			C	1	0.59	1	1	1	71.667			
L5 100.00-80.00	873.60	4410.92	A	1	0.59	1	1	1	81.667	1332.78	66.64	C
			B	1	0.59	1	1	1	81.667			
			C	1	0.59	1	1	1	81.667			
L6 80.00-60.00	873.60	4965.28	A	1	0.59	1	1	1	91.667	1392.33	69.62	C
			B	1	0.59	1	1	1	91.667			
			C	1	0.59	1	1	1	91.667			
L7 60.00-40.00	873.60	5519.64	A	1	0.59	1	1	1	101.667	1402.67	70.13	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
L8 40.00-20.00	873.60	7099.78	A	1	0.59	1	1	1	101.667	1245.66	62.28	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
L9 20.00-0.00	567.84	8673.24	A	1	0.59	1	1	1	101.667	1245.66	62.28	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
Sum Weight:	7032.36	42220.60						OTM	945901.27 lb-ft	11142.83		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 175.00-160.00	218.40	1645.11	A	1	0.59	1	1	1	31.250	609.03	40.60	C
			B	1	0.59	1	1	1	31.250			
			C	1	0.59	1	1	1	31.250			
L2 160.00-140.00	714.60	2747.84	A	1	0.59	1	1	1	51.667	1118.75	55.94	C
			B	1	0.59	1	1	1	51.667			
			C	1	0.59	1	1	1	51.667			
L3 140.00-120.00	1163.52	3302.20	A	1	0.59	1	1	1	61.667	1557.36	77.87	C
			B	1	0.59	1	1	1	61.667			
			C	1	0.59	1	1	1	61.667			
L4 120.00-100.00	873.60	3856.56	A	1	0.59	1	1	1	71.667	1238.60	61.93	C
			B	1	0.59	1	1	1	71.667			
			C	1	0.59	1	1	1	71.667			
L5 100.00-80.00	873.60	4410.92	A	1	0.59	1	1	1	81.667	1332.78	66.64	C
			B	1	0.59	1	1	1	81.667			
			C	1	0.59	1	1	1	81.667			
L6 80.00-60.00	873.60	4965.28	A	1	0.59	1	1	1	91.667	1392.33	69.62	C
			B	1	0.59	1	1	1	91.667			
			C	1	0.59	1	1	1	91.667			
L7 60.00-40.00	873.60	5519.64	A	1	0.59	1	1	1	101.667	1402.67	70.13	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
L8 40.00-	873.60	7099.78	A	1	0.59	1	1	1	101.667	1245.66	62.28	C

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
20.00			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
L9 20.00-0.00	567.84	8673.24	A	1	0.59	1	1	1	101.667	1245.66	62.28	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
Sum Weight:	7032.36	42220.60						OTM	945901.27 lb-ft	11142.83		

Tower Forces - With Ice - Wind 60 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	lb	lb							ft^2	lb	plf	
L1 175.00-160.00	218.40	1645.11	A	1	0.59	1	1	1	31.250	609.03	40.60	C
			B	1	0.59	1	1	1	31.250			
			C	1	0.59	1	1	1	31.250			
L2 160.00-140.00	714.60	2747.84	A	1	0.59	1	1	1	51.667	1118.75	55.94	C
			B	1	0.59	1	1	1	51.667			
			C	1	0.59	1	1	1	51.667			
L3 140.00-120.00	1163.52	3302.20	A	1	0.59	1	1	1	61.667	1557.36	77.87	C
			B	1	0.59	1	1	1	61.667			
			C	1	0.59	1	1	1	61.667			
L4 120.00-100.00	873.60	3856.56	A	1	0.59	1	1	1	71.667	1238.60	61.93	C
			B	1	0.59	1	1	1	71.667			
			C	1	0.59	1	1	1	71.667			
L5 100.00-80.00	873.60	4410.92	A	1	0.59	1	1	1	81.667	1332.78	66.64	C
			B	1	0.59	1	1	1	81.667			
			C	1	0.59	1	1	1	81.667			
L6 80.00-60.00	873.60	4965.28	A	1	0.59	1	1	1	91.667	1392.33	69.62	C
			B	1	0.59	1	1	1	91.667			
			C	1	0.59	1	1	1	91.667			
L7 60.00-40.00	873.60	5519.64	A	1	0.59	1	1	1	101.667	1402.67	70.13	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
L8 40.00-20.00	873.60	7099.78	A	1	0.59	1	1	1	101.667	1245.66	62.28	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
L9 20.00-0.00	567.84	8673.24	A	1	0.59	1	1	1	101.667	1245.66	62.28	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
Sum Weight:	7032.36	42220.60						OTM	945901.27 lb-ft	11142.83		

Tower Forces - With Ice - Wind 90 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	lb	lb							ft^2	lb	plf	
L1 175.00-	218.40	1645.11	A	1	0.59	1	1	1	31.250	609.03	40.60	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
160.00			B	1	0.59	1	1	1	31.250			
			C	1	0.59	1	1	1	31.250			
L2 160.00-140.00	714.60	2747.84	A	1	0.59	1	1	1	51.667	1118.75	55.94	C
			B	1	0.59	1	1	1	51.667			
			C	1	0.59	1	1	1	51.667			
L3 140.00-120.00	1163.52	3302.20	A	1	0.59	1	1	1	61.667	1557.36	77.87	C
			B	1	0.59	1	1	1	61.667			
			C	1	0.59	1	1	1	61.667			
L4 120.00-100.00	873.60	3856.56	A	1	0.59	1	1	1	71.667	1238.60	61.93	C
			B	1	0.59	1	1	1	71.667			
			C	1	0.59	1	1	1	71.667			
L5 100.00-80.00	873.60	4410.92	A	1	0.59	1	1	1	81.667	1332.78	66.64	C
			B	1	0.59	1	1	1	81.667			
			C	1	0.59	1	1	1	81.667			
L6 80.00-60.00	873.60	4965.28	A	1	0.59	1	1	1	91.667	1392.33	69.62	C
			B	1	0.59	1	1	1	91.667			
			C	1	0.59	1	1	1	91.667			
L7 60.00-40.00	873.60	5519.64	A	1	0.59	1	1	1	101.667	1402.67	70.13	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
L8 40.00-20.00	873.60	7099.78	A	1	0.59	1	1	1	101.667	1245.66	62.28	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
L9 20.00-0.00	567.84	8673.24	A	1	0.59	1	1	1	101.667	1245.66	62.28	C
			B	1	0.59	1	1	1	101.667			
			C	1	0.59	1	1	1	101.667			
Sum Weight:	7032.36	42220.60						OTM	945901.27 lb-ft	11142.83		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 175.00-160.00	218.40	1420.62	A	1	0.59	1	1	1	30.000	304.52	20.30	C
			B	1	0.59	1	1	1	30.000			
			C	1	0.59	1	1	1	30.000			
L2 160.00-140.00	624.00	2375.22	A	1	0.59	1	1	1	50.000	541.29	27.06	C
			B	1	0.59	1	1	1	50.000			
			C	1	0.59	1	1	1	50.000			
L3 140.00-120.00	873.60	2856.27	A	1	0.59	1	1	1	60.000	718.58	35.93	C
			B	1	0.59	1	1	1	60.000			
			C	1	0.59	1	1	1	60.000			
L4 120.00-100.00	873.60	3337.33	A	1	0.59	1	1	1	70.000	630.10	31.51	C
			B	1	0.59	1	1	1	70.000			
			C	1	0.59	1	1	1	70.000			
L5 100.00-80.00	873.60	3818.38	A	1	0.59	1	1	1	80.000	679.99	34.00	C
			B	1	0.59	1	1	1	80.000			
			C	1	0.59	1	1	1	80.000			
L6 80.00-60.00	873.60	4299.44	A	1	0.59	1	1	1	90.000	711.99	35.60	C
			B	1	0.59	1	1	1	90.000			
			C	1	0.59	1	1	1	90.000			
L7 60.00-40.00	873.60	4780.50	A	1	0.59	1	1	1	100.000	718.58	35.93	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L8 40.00-20.00	873.60	6360.63	A	1	0.59	1	1	1	100.000	638.14	31.91	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L9 20.00-0.00	567.84	7934.09	A	1	0.59	1	1	1	100.000	638.14	31.91	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
Sum Weight:	6651.84	37182.48						OTM	467419.23 lb-ft	5581.33		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 175.00-160.00	218.40	1420.62	A	1	0.59	1	1	1	30.000	304.52	20.30	C
			B	1	0.59	1	1	1	30.000			
			C	1	0.59	1	1	1	30.000			
L2 160.00-140.00	624.00	2375.22	A	1	0.59	1	1	1	50.000	541.29	27.06	C
			B	1	0.59	1	1	1	50.000			
			C	1	0.59	1	1	1	50.000			
L3 140.00-120.00	873.60	2856.27	A	1	0.59	1	1	1	60.000	718.58	35.93	C
			B	1	0.59	1	1	1	60.000			
			C	1	0.59	1	1	1	60.000			
L4 120.00-100.00	873.60	3337.33	A	1	0.59	1	1	1	70.000	630.10	31.51	C
			B	1	0.59	1	1	1	70.000			
			C	1	0.59	1	1	1	70.000			
L5 100.00-80.00	873.60	3818.38	A	1	0.59	1	1	1	80.000	679.99	34.00	C
			B	1	0.59	1	1	1	80.000			
			C	1	0.59	1	1	1	80.000			
L6 80.00-60.00	873.60	4299.44	A	1	0.59	1	1	1	90.000	711.99	35.60	C
			B	1	0.59	1	1	1	90.000			
			C	1	0.59	1	1	1	90.000			
L7 60.00-40.00	873.60	4780.50	A	1	0.59	1	1	1	100.000	718.58	35.93	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L8 40.00-20.00	873.60	6360.63	A	1	0.59	1	1	1	100.000	638.14	31.91	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L9 20.00-0.00	567.84	7934.09	A	1	0.59	1	1	1	100.000	638.14	31.91	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
Sum Weight:	6651.84	37182.48						OTM	467419.23 lb-ft	5581.33		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 175.00-160.00	218.40	1420.62	A	1	0.59	1	1	1	30.000	304.52	20.30	C
			B	1	0.59	1	1	1	30.000			
			C	1	0.59	1	1	1	30.000			
L2 160.00-140.00	624.00	2375.22	A	1	0.59	1	1	1	50.000	541.29	27.06	C
			B	1	0.59	1	1	1	50.000			
			C	1	0.59	1	1	1	50.000			
L3 140.00-120.00	873.60	2856.27	A	1	0.59	1	1	1	60.000	718.58	35.93	C
			B	1	0.59	1	1	1	60.000			
			C	1	0.59	1	1	1	60.000			
L4 120.00-100.00	873.60	3337.33	A	1	0.59	1	1	1	70.000	630.10	31.51	C
			B	1	0.59	1	1	1	70.000			
			C	1	0.59	1	1	1	70.000			
L5 100.00-80.00	873.60	3818.38	A	1	0.59	1	1	1	80.000	679.99	34.00	C
			B	1	0.59	1	1	1	80.000			
			C	1	0.59	1	1	1	80.000			
L6 80.00-60.00	873.60	4299.44	A	1	0.59	1	1	1	90.000	711.99	35.60	C
			B	1	0.59	1	1	1	90.000			
			C	1	0.59	1	1	1	90.000			
L7 60.00-40.00	873.60	4780.50	A	1	0.59	1	1	1	100.000	718.58	35.93	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L8 40.00-20.00	873.60	6360.63	A	1	0.59	1	1	1	100.000	638.14	31.91	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L9 20.00-0.00	567.84	7934.09	A	1	0.59	1	1	1	100.000	638.14	31.91	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
Sum Weight:	6651.84	37182.48						OTM	467419.23 lb-ft	5581.33		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 175.00-160.00	218.40	1420.62	A	1	0.59	1	1	1	30.000	304.52	20.30	C
			B	1	0.59	1	1	1	30.000			
			C	1	0.59	1	1	1	30.000			
L2 160.00-140.00	624.00	2375.22	A	1	0.59	1	1	1	50.000	541.29	27.06	C
			B	1	0.59	1	1	1	50.000			
			C	1	0.59	1	1	1	50.000			
L3 140.00-120.00	873.60	2856.27	A	1	0.59	1	1	1	60.000	718.58	35.93	C
			B	1	0.59	1	1	1	60.000			
			C	1	0.59	1	1	1	60.000			
L4 120.00-100.00	873.60	3337.33	A	1	0.59	1	1	1	70.000	630.10	31.51	C
			B	1	0.59	1	1	1	70.000			
			C	1	0.59	1	1	1	70.000			
L5 100.00-80.00	873.60	3818.38	A	1	0.59	1	1	1	80.000	679.99	34.00	C
			B	1	0.59	1	1	1	80.000			
			C	1	0.59	1	1	1	80.000			
L6 80.00-60.00	873.60	4299.44	A	1	0.59	1	1	1	90.000	711.99	35.60	C
			B	1	0.59	1	1	1	90.000			
			C	1	0.59	1	1	1	90.000			
L7 60.00-40.00	873.60	4780.50	A	1	0.59	1	1	1	100.000	718.58	35.93	C
			B	1	0.59	1	1	1	100.000			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
			C	1	0.59	1	1	1	100.000			
L8 40.00-20.00	873.60	6360.63	A	1	0.59	1	1	1	100.000	638.14	31.91	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
L9 20.00-0.00	567.84	7934.09	A	1	0.59	1	1	1	100.000	638.14	31.91	C
			B	1	0.59	1	1	1	100.000			
			C	1	0.59	1	1	1	100.000			
Sum Weight:	6651.84	37182.48						OTM	467419.23 lb-ft	5581.33		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	37182.48					
Bracing Weight	0.00					
Total Member Self-Weight	37182.48			0.00	0.00	
Total Weight	48508.17			0.00	0.00	
Wind 0 deg - No Ice		0.00	-20723.66	-2196292.55	0.00	0.00
Wind 30 deg - No Ice		10361.83	-17947.22	-1902045.14	-1098146.27	0.00
Wind 45 deg - No Ice		14653.84	-14653.84	-1553013.35	-1553013.35	0.00
Wind 60 deg - No Ice		17947.22	-10361.83	-1098146.27	-1902045.14	0.00
Wind 90 deg - No Ice		20723.66	0.00	0.00	-2196292.55	0.00
Wind 120 deg - No Ice		17947.22	10361.83	1098146.27	-1902045.14	0.00
Wind 135 deg - No Ice		14653.84	14653.84	1553013.35	-1553013.35	0.00
Wind 150 deg - No Ice		10361.83	17947.22	1902045.14	-1098146.27	0.00
Wind 180 deg - No Ice		0.00	20723.66	2196292.55	0.00	0.00
Wind 210 deg - No Ice		-10361.83	17947.22	1902045.14	1098146.27	0.00
Wind 225 deg - No Ice		-14653.84	14653.84	1553013.35	1553013.35	0.00
Wind 240 deg - No Ice		-17947.22	10361.83	1098146.27	1902045.14	0.00
Wind 270 deg - No Ice		-20723.66	0.00	0.00	2196292.55	0.00
Wind 300 deg - No Ice		-17947.22	-10361.83	-1098146.27	1902045.14	0.00
Wind 315 deg - No Ice		-14653.84	-14653.84	-1553013.35	1553013.35	0.00
Wind 330 deg - No Ice		-10361.83	-17947.22	-1902045.14	1098146.27	0.00
Member Ice	5038.11					
Total Weight Ice	56505.08			0.00	0.00	
Wind 0 deg - Ice		0.00	-16731.32	-1813789.18	0.00	0.00
Wind 30 deg - Ice		8365.66	-14489.74	-1570787.51	-906894.59	0.00
Wind 45 deg - Ice		11830.83	-11830.83	-1282542.63	-1282542.63	0.00
Wind 60 deg - Ice		14489.74	-8365.66	-906894.59	-1570787.51	0.00
Wind 90 deg - Ice		16731.32	0.00	0.00	-1813789.18	0.00
Wind 120 deg - Ice		14489.74	8365.66	906894.59	-1570787.51	0.00
Wind 135 deg - Ice		11830.83	11830.83	1282542.63	-1282542.63	0.00
Wind 150 deg - Ice		8365.66	14489.74	1570787.51	-906894.59	0.00
Wind 180 deg - Ice		0.00	16731.32	1813789.18	0.00	0.00
Wind 210 deg - Ice		-8365.66	14489.74	1570787.51	906894.59	0.00
Wind 225 deg - Ice		-11830.83	11830.83	1282542.63	1282542.63	0.00
Wind 240 deg - Ice		-14489.74	8365.66	906894.59	1570787.51	0.00
Wind 270 deg - Ice		-16731.32	0.00	0.00	1813789.18	0.00
Wind 300 deg - Ice		-14489.74	-8365.66	-906894.59	1570787.51	0.00
Wind 315 deg - Ice		-11830.83	-11830.83	-1282542.63	1282542.63	0.00
Wind 330 deg - Ice		-8365.66	-14489.74	-1570787.51	906894.59	0.00
Total Weight	48508.17			0.00	0.00	
Wind 0 deg - Service		0.00	-8095.18	-857926.78	0.00	0.00

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 30 deg - Service		4047.59	-7010.63	-742986.38	-428963.39	0.00
Wind 45 deg - Service		5724.16	-5724.16	-606645.84	-606645.84	0.00
Wind 60 deg - Service		7010.63	-4047.59	-428963.39	-742986.38	0.00
Wind 90 deg - Service		8095.18	0.00	0.00	-857926.78	0.00
Wind 120 deg - Service		7010.63	4047.59	428963.39	-742986.38	0.00
Wind 135 deg - Service		5724.16	5724.16	606645.84	-606645.84	0.00
Wind 150 deg - Service		4047.59	7010.63	742986.38	-428963.39	0.00
Wind 180 deg - Service		0.00	8095.18	857926.78	0.00	0.00
Wind 210 deg - Service		-4047.59	7010.63	742986.38	428963.39	0.00
Wind 225 deg - Service		-5724.16	5724.16	606645.84	606645.84	0.00
Wind 240 deg - Service		-7010.63	4047.59	428963.39	742986.38	0.00
Wind 270 deg - Service		-8095.18	0.00	0.00	857926.78	0.00
Wind 300 deg - Service		-7010.63	-4047.59	-428963.39	742986.38	0.00
Wind 315 deg - Service		-5724.16	-5724.16	-606645.84	606645.84	0.00
Wind 330 deg - Service		-4047.59	-7010.63	-742986.38	428963.39	0.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service

Comb. No.	Description
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 lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	175 - 160	Pole	Max Tension	6	0.00	0.00	0.00
			Max. Compression	18	-4234.76	0.00	0.00
			Max. Mx	6	-2992.86	-24965.72	0.00
			Max. My	2	-2992.86	0.00	24965.72
			Max. Vy	6	2595.92	-24965.72	0.00
			Max. Vx	2	-2595.92	0.00	24965.72
			Max. Torque	20			-0.00
L2	160 - 140	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-12578.08	0.00	0.00
			Max. Mx	6	-9063.85	-138514.74	0.00
			Max. My	2	-9063.85	0.00	138514.74
			Max. Vy	6	8861.97	-138514.74	0.00
			Max. Vx	2	-8861.97	0.00	138514.74
			Max. Torque	34			0.00
L3	140 - 120	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-17043.80	0.00	0.00
			Max. Mx	6	-12777.09	-334834.59	0.00
			Max. My	2	-12777.09	0.00	334834.59
			Max. Vy	6	10762.87	-334834.59	0.00
			Max. Vx	2	-10762.87	0.00	334834.59
			Max. Torque	34			0.00
L4	120 - 100	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-21773.97	0.00	0.00
			Max. Mx	6	-16998.44	-566632.77	0.00
			Max. My	2	-16998.44	0.00	566632.77
			Max. Vy	6	12409.69	-566632.77	0.00
			Max. Vx	2	-12409.69	0.00	566632.77
			Max. Torque	34			0.00
L5	100 - 80	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-27058.49	0.00	0.00
			Max. Mx	6	-21714.99	-832332.17	0.00
			Max. My	2	-21714.99	0.00	832332.17
			Max. Vy	6	14153.37	-832332.17	0.00
			Max. Vx	2	-14153.37	0.00	832332.17
			Max. Torque	34			0.00
L6	80 - 60	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-32897.38	0.00	0.00
			Max. Mx	6	-26926.01	-1133384.54	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. My	2	-26926.01	0.00	1133384.54
			Max. Vy	6	15945.53	-1133384.54	0.00
			Max. Vx	2	-15945.53	0.00	1133384.54
			Max. Torque	34			0.00
L7	60 - 40	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-39290.62	0.00	0.00
			Max. Mx	6	-32630.93	-1470085.33	0.00
			Max. My	2	-32630.93	0.00	1470085.33
			Max. Vy	6	17718.82	-1470085.33	0.00
			Max. Vx	2	-17718.82	0.00	1470085.33
			Max. Torque	34			0.00
L8	40 - 20	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-47264.00	0.00	0.00
			Max. Mx	6	-39928.64	-1839857.95	0.00
			Max. My	2	-39928.64	0.00	1839857.95
			Max. Vy	6	19251.87	-1839857.95	0.00
			Max. Vx	2	-19251.87	0.00	1839857.95
			Max. Torque	30			0.00
L9	20 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-56505.08	0.00	0.00
			Max. Mx	6	-48505.94	-2239737.69	0.00
			Max. My	2	-48505.94	0.00	2239737.69
			Max. Vy	6	20728.90	-2239737.69	0.00
			Max. Vx	2	-20728.90	0.00	2239737.69
			Max. Torque	30			0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	18	56505.08	0.00	0.00
	Max. H_x	14	48508.17	20723.66	0.00
	Max. H_z	2	48508.17	0.00	20723.66
	Max. M_x	2	2239737.69	0.00	20723.66
	Max. M_z	6	2239737.69	-20723.66	0.00
	Max. Torsion	30	0.00	14489.75	-8365.66
	Min. Vert	39	48508.17	-8095.18	0.00
	Min. H_x	6	48508.17	-20723.66	0.00
	Min. H_z	10	48508.17	0.00	-20723.66
	Min. M_x	10	-2239737.69	0.00	-20723.66
	Min. M_z	14	-2239737.69	20723.66	0.00
	Min. Torsion	24	-0.00	-14489.75	-8365.66

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead Only	48508.17	0.00	0.00	0.00	0.00	0.00
Dead+Wind 0 deg - No Ice	48508.17	0.00	-20723.66	-2239737.69	0.00	0.00
Dead+Wind 30 deg - No Ice	48508.17	10361.83	-17947.22	-1939670.35	-1119869.20	0.00
Dead+Wind 45 deg - No Ice	48508.17	14653.84	-14653.84	-1583734.21	-1583734.21	0.00
Dead+Wind 60 deg - No Ice	48508.17	17947.22	-10361.83	-1119869.20	-1939670.35	-0.00
Dead+Wind 90 deg - No Ice	48508.17	20723.66	0.00	0.00	-2239737.69	0.00
Dead+Wind 120 deg - No Ice	48508.17	17947.22	10361.83	1119869.20	-1939670.35	0.00
Dead+Wind 135 deg - No Ice	48508.17	14653.84	14653.84	1583734.21	-1583734.21	0.00
Dead+Wind 150 deg - No Ice	48508.17	10361.83	17947.22	1939670.35	-1119869.20	-0.00
Dead+Wind 180 deg - No Ice	48508.17	0.00	20723.66	2239737.69	0.00	0.00
Dead+Wind 210 deg - No Ice	48508.17	-10361.83	17947.22	1939670.35	1119869.20	0.00
Dead+Wind 225 deg - No Ice	48508.17	-14653.84	14653.84	1583734.21	1583734.21	0.00
Dead+Wind 240 deg - No Ice	48508.17	-17947.22	10361.83	1119869.20	1939670.35	-0.00
Dead+Wind 270 deg - No Ice	48508.17	-20723.66	0.00	0.00	2239737.69	0.00
Dead+Wind 300 deg - No Ice	48508.17	-17947.22	-10361.83	-1119869.20	1939670.35	0.00
Dead+Wind 315 deg - No Ice	48508.17	-14653.84	-14653.84	-1583734.21	1583734.21	0.00
Dead+Wind 330 deg - No Ice	48508.17	-10361.83	-17947.22	-1939670.35	1119869.20	-0.00
Dead+Ice+Temp	56505.08	0.00	0.00	0.00	0.00	0.00
Dead+Wind 0 deg+Ice+Temp	56505.08	0.00	-16731.32	-1859884.27	0.00	0.00
Dead+Wind 30 deg+Ice+Temp	56505.08	8365.66	-14489.75	-1610707.03	-929942.14	0.00
Dead+Wind 45 deg+Ice+Temp	56505.08	11830.83	-11830.83	-1315136.78	-1315136.78	0.00
Dead+Wind 60 deg+Ice+Temp	56505.08	14489.75	-8365.66	-929942.14	-1610707.03	-0.00
Dead+Wind 90 deg+Ice+Temp	56505.08	16731.32	0.00	0.00	-1859884.27	0.00
Dead+Wind 120 deg+Ice+Temp	56505.08	14489.75	8365.66	929942.14	-1610707.03	0.00
Dead+Wind 135 deg+Ice+Temp	56505.08	11830.83	11830.83	1315136.78	-1315136.78	0.00
Dead+Wind 150 deg+Ice+Temp	56505.08	8365.66	14489.75	1610707.03	-929942.14	-0.00
Dead+Wind 180 deg+Ice+Temp	56505.08	0.00	16731.32	1859884.27	0.00	0.00
Dead+Wind 210 deg+Ice+Temp	56505.08	-8365.66	14489.75	1610707.03	929942.14	0.00
Dead+Wind 225 deg+Ice+Temp	56505.08	-11830.83	11830.83	1315136.78	1315136.78	0.00
Dead+Wind 240 deg+Ice+Temp	56505.08	-14489.75	8365.66	929942.14	1610707.03	-0.00
Dead+Wind 270 deg+Ice+Temp	56505.08	-16731.32	0.00	0.00	1859884.27	0.00
Dead+Wind 300 deg+Ice+Temp	56505.08	-14489.75	-8365.66	-929942.14	1610707.03	0.00
Dead+Wind 315 deg+Ice+Temp	56505.08	-11830.83	-11830.83	-1315136.78	1315136.78	0.00
Dead+Wind 330 deg+Ice+Temp	56505.08	-8365.66	-14489.75	-1610707.03	929942.14	-0.00
Dead+Wind 0 deg - Service	48508.17	0.00	-8095.18	-874993.97	0.00	0.00
Dead+Wind 30 deg - Service	48508.17	4047.59	-7010.63	-757767.01	-437496.99	0.00
Dead+Wind 45 deg - Service	48508.17	5724.16	-5724.16	-618714.17	-618714.17	0.00
Dead+Wind 60 deg - Service	48508.17	7010.63	-4047.59	-437496.99	-757767.01	-0.00
Dead+Wind 90 deg - Service	48508.17	8095.18	0.00	0.00	-874993.97	0.00
Dead+Wind 120 deg - Service	48508.17	7010.63	4047.59	437496.99	-757767.01	0.00
Dead+Wind 135 deg - Service	48508.17	5724.16	5724.16	618714.17	-618714.17	0.00
Dead+Wind 150 deg - Service	48508.17	4047.59	7010.63	757767.01	-437496.99	-0.00
Dead+Wind 180 deg - Service	48508.17	0.00	8095.18	874993.97	0.00	0.00
Dead+Wind 210 deg - Service	48508.17	-4047.59	7010.63	757767.01	437496.99	0.00
Dead+Wind 225 deg - Service	48508.17	-5724.16	5724.16	618714.17	618714.17	0.00
Dead+Wind 240 deg - Service	48508.17	-7010.63	4047.59	437496.99	757767.01	-0.00
Dead+Wind 270 deg - Service	48508.17	-8095.18	0.00	0.00	874993.97	0.00
Dead+Wind 300 deg - Service	48508.17	-7010.63	-4047.59	-437496.99	757767.01	0.00
Dead+Wind 315 deg - Service	48508.17	-5724.16	-5724.16	-618714.17	618714.17	0.00
Dead+Wind 330 deg - Service	48508.17	-4047.59	-7010.63	-757767.01	437496.99	-0.00

Solution Summary

Load Comb.	Sum of Applied Forces PX	PY	PZ	Sum of Reactions PX	PY	PZ	% Error
	lb	lb	lb	lb	lb	lb	
1	0.00	-48508.17	0.00	0.00	48508.17	0.00	0.000%
2	0.00	-48508.17	-20723.66	0.00	48508.17	20723.66	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
3	10361.83	-48508.17	-17947.22	-10361.83	48508.17	17947.22	0.000%
4	14653.84	-48508.17	-14653.84	-14653.84	48508.17	14653.84	0.000%
5	17947.22	-48508.17	-10361.83	-17947.22	48508.17	10361.83	0.000%
6	20723.66	-48508.17	0.00	-20723.66	48508.17	0.00	0.000%
7	17947.22	-48508.17	10361.83	-17947.22	48508.17	-10361.83	0.000%
8	14653.84	-48508.17	14653.84	-14653.84	48508.17	-14653.84	0.000%
9	10361.83	-48508.17	17947.22	-10361.83	48508.17	-17947.22	0.000%
10	0.00	-48508.17	20723.66	0.00	48508.17	-20723.66	0.000%
11	-10361.83	-48508.17	17947.22	10361.83	48508.17	-17947.22	0.000%
12	-14653.84	-48508.17	14653.84	14653.84	48508.17	-14653.84	0.000%
13	-17947.22	-48508.17	10361.83	17947.22	48508.17	-10361.83	0.000%
14	-20723.66	-48508.17	0.00	20723.66	48508.17	0.00	0.000%
15	-17947.22	-48508.17	-10361.83	17947.22	48508.17	10361.83	0.000%
16	-14653.84	-48508.17	-14653.84	14653.84	48508.17	14653.84	0.000%
17	-10361.83	-48508.17	-17947.22	10361.83	48508.17	17947.22	0.000%
18	0.00	-56505.08	0.00	0.00	56505.08	0.00	0.000%
19	0.00	-56505.08	-16731.32	0.00	56505.08	16731.32	0.000%
20	8365.66	-56505.08	-14489.74	-8365.66	56505.08	14489.75	0.000%
21	11830.83	-56505.08	-11830.83	-11830.83	56505.08	11830.83	0.000%
22	14489.74	-56505.08	-8365.66	-14489.75	56505.08	8365.66	0.000%
23	16731.32	-56505.08	0.00	-16731.32	56505.08	0.00	0.000%
24	14489.74	-56505.08	8365.66	-14489.75	56505.08	-8365.66	0.000%
25	11830.83	-56505.08	11830.83	-11830.83	56505.08	-11830.83	0.000%
26	8365.66	-56505.08	14489.74	-8365.66	56505.08	-14489.75	0.000%
27	0.00	-56505.08	16731.32	0.00	56505.08	-16731.32	0.000%
28	-8365.66	-56505.08	14489.74	8365.66	56505.08	-14489.75	0.000%
29	-11830.83	-56505.08	11830.83	11830.83	56505.08	-11830.83	0.000%
30	-14489.74	-56505.08	8365.66	14489.75	56505.08	-8365.66	0.000%
31	-16731.32	-56505.08	0.00	16731.32	56505.08	0.00	0.000%
32	-14489.74	-56505.08	-8365.66	14489.75	56505.08	8365.66	0.000%
33	-11830.83	-56505.08	-11830.83	11830.83	56505.08	11830.83	0.000%
34	-8365.66	-56505.08	-14489.74	8365.66	56505.08	14489.75	0.000%
35	0.00	-48508.17	-8095.18	0.00	48508.17	8095.18	0.000%
36	4047.59	-48508.17	-7010.63	-4047.59	48508.17	7010.63	0.000%
37	5724.16	-48508.17	-5724.16	-5724.16	48508.17	5724.16	0.000%
38	7010.63	-48508.17	-4047.59	-7010.63	48508.17	4047.59	0.000%
39	8095.18	-48508.17	0.00	-8095.18	48508.17	0.00	0.000%
40	7010.63	-48508.17	4047.59	-7010.63	48508.17	-4047.59	0.000%
41	5724.16	-48508.17	5724.16	-5724.16	48508.17	-5724.16	0.000%
42	4047.59	-48508.17	7010.63	-4047.59	48508.17	-7010.63	0.000%
43	0.00	-48508.17	8095.18	0.00	48508.17	-8095.18	0.000%
44	-4047.59	-48508.17	7010.63	4047.59	48508.17	-7010.63	0.000%
45	-5724.16	-48508.17	5724.16	5724.16	48508.17	-5724.16	0.000%
46	-7010.63	-48508.17	4047.59	7010.63	48508.17	-4047.59	0.000%
47	-8095.18	-48508.17	0.00	8095.18	48508.17	0.00	0.000%
48	-7010.63	-48508.17	-4047.59	7010.63	48508.17	4047.59	0.000%
49	-5724.16	-48508.17	-5724.16	5724.16	48508.17	5724.16	0.000%
50	-4047.59	-48508.17	-7010.63	4047.59	48508.17	7010.63	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00013930
3	Yes	5	0.00000001	0.00005465

4	Yes	5	0.00000001	0.00006271
5	Yes	5	0.00000001	0.00005465
6	Yes	4	0.00000001	0.00013930
7	Yes	5	0.00000001	0.00005465
8	Yes	5	0.00000001	0.00006271
9	Yes	5	0.00000001	0.00005465
10	Yes	4	0.00000001	0.00013930
11	Yes	5	0.00000001	0.00005465
12	Yes	5	0.00000001	0.00006271
13	Yes	5	0.00000001	0.00005465
14	Yes	4	0.00000001	0.00013930
15	Yes	5	0.00000001	0.00005465
16	Yes	5	0.00000001	0.00006271
17	Yes	5	0.00000001	0.00005465
18	Yes	4	0.00000001	0.00000001
19	Yes	5	0.00000001	0.00016166
20	Yes	5	0.00000001	0.00020593
21	Yes	5	0.00000001	0.00021864
22	Yes	5	0.00000001	0.00020593
23	Yes	5	0.00000001	0.00016166
24	Yes	5	0.00000001	0.00020593
25	Yes	5	0.00000001	0.00021864
26	Yes	5	0.00000001	0.00020593
27	Yes	5	0.00000001	0.00016166
28	Yes	5	0.00000001	0.00020593
29	Yes	5	0.00000001	0.00021864
30	Yes	5	0.00000001	0.00020593
31	Yes	5	0.00000001	0.00016166
32	Yes	5	0.00000001	0.00020593
33	Yes	5	0.00000001	0.00021864
34	Yes	5	0.00000001	0.00020593
35	Yes	4	0.00000001	0.00006198
36	Yes	4	0.00000001	0.00018205
37	Yes	4	0.00000001	0.00020708
38	Yes	4	0.00000001	0.00018205
39	Yes	4	0.00000001	0.00006198
40	Yes	4	0.00000001	0.00018205
41	Yes	4	0.00000001	0.00020708
42	Yes	4	0.00000001	0.00018205
43	Yes	4	0.00000001	0.00006198
44	Yes	4	0.00000001	0.00018205
45	Yes	4	0.00000001	0.00020708
46	Yes	4	0.00000001	0.00018205
47	Yes	4	0.00000001	0.00006198
48	Yes	4	0.00000001	0.00018205
49	Yes	4	0.00000001	0.00020708
50	Yes	4	0.00000001	0.00018205

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
L1	175 - 160	14.358	39	0.6834	0.0000
L2	160 - 140	12.218	39	0.6753	0.0000
L3	140 - 120	9.452	39	0.6345	0.0000
L4	120 - 100	6.935	39	0.5565	0.0000
L5	100 - 80	4.783	39	0.4627	0.0000
L6	80 - 60	3.036	39	0.3654	0.0000
L7	60 - 40	1.696	39	0.2694	0.0000

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L8	40 - 20	0.753	39	0.1770	0.0000
L9	20 - 0	0.191	39	0.0881	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
173.00	(2) RR90-17-02DP	39	14.072	0.6828	0.0000	189861
165.00	7250.03 w/Mount Pipe	39	12.928	0.6794	0.0000	94930
155.00	DB948F85T2E-M	39	11.512	0.6689	0.0000	39474
145.00	(4) DB844H90	39	10.126	0.6485	0.0000	22524

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	175 - 160	36.746	6	1.7492	0.0000
L2	160 - 140	31.269	6	1.7283	0.0000
L3	140 - 120	24.191	6	1.6239	0.0000
L4	120 - 100	17.749	6	1.4243	0.0000
L5	100 - 80	12.242	6	1.1843	0.0000
L6	80 - 60	7.771	6	0.9352	0.0000
L7	60 - 40	4.341	6	0.6897	0.0000
L8	40 - 20	1.927	6	0.4529	0.0000
L9	20 - 0	0.488	6	0.2256	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
173.00	(2) RR90-17-02DP	6	36.013	1.7476	0.0000	74312
165.00	7250.03 w/Mount Pipe	6	33.088	1.7387	0.0000	37155
155.00	DB948F85T2E-M	6	29.463	1.7119	0.0000	15449
145.00	(4) DB844H90	6	25.916	1.6599	0.0000	8814

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	175 - 160 (1)	P24x3/8	15.00	175.00	251.4	2.363	27.8325	-4179.70	65770.10	0.064
L2	160 - 140 (2)	P30x3/8	20.00	175.00	200.5	3.715	34.9011	-9063.84	129673.00	0.070
L3	140 - 120 (3)	P36x3/8	20.00	175.00	166.7	5.373	41.9697	-12777.10	225484.00	0.057
L4	120 - 100 (4)	P42x3/8	20.00	175.00	142.7	7.334	49.0383	-16998.40	359668.00	0.047
L5	100 - 80 (5)	P48x3/8	20.00	175.00	124.7	9.601	56.1069	-21715.00	538686.00	0.040
L6	80 - 60 (6)	P54x3/8	20.00	175.00	110.8	12.057	63.1755	-26926.00	761712.00	0.035
L7	60 - 40 (7)	P60x3/8	20.00	175.00	99.6	13.992	70.2440	-32630.90	982850.00	0.033
L8	40 - 20 (8)	P60x1/2	20.00	175.00	99.8	13.957	93.4624	-39928.60	1304470.00	0.031
L9	20 - 0 (9)	P60x5/8	20.00	175.00	100.0	13.922	116.5830	-48505.90	1623100.00	0.030

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	175 - 160 (1)	P24x3/8	21187.58	-1.571	27.720	0.057	0.00	0.000	27.720	0.000
L2	160 - 140 (2)	P30x3/8	138515.00	-6.511	25.075	0.260	0.00	0.000	25.075	0.000
L3	140 - 120 (3)	P36x3/8	334835.00	-10.861	23.696	0.458	0.00	0.000	23.696	0.000
L4	120 - 100 (4)	P42x3/8	566633.33	-13.444	22.711	0.592	0.00	0.000	22.711	0.000
L5	100 - 80 (5)	P48x3/8	832332.50	-15.068	21.972	0.686	0.00	0.000	21.972	0.000
L6	80 - 60 (6)	P54x3/8	1133383.33	-16.170	21.397	0.756	0.00	0.000	21.397	0.000
L7	60 - 40 (7)	P60x3/8	1470083.33	-16.953	20.938	0.810	0.00	0.000	20.938	0.000
L8	40 - 20 (8)	P60x1/2	1839858.33	-16.013	22.317	0.718	0.00	0.000	22.317	0.000
L9	20 - 0 (9)	P60x5/8	2239741.67	-15.693	23.696	0.662	0.00	0.000	23.696	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	175 - 160 (1)	P24x3/8	0.064	0.057	0.000	0.120 ✓	1.333	H1-3 ✓
L2	160 - 140 (2)	P30x3/8	0.070	0.260	0.000	0.330 ✓	1.333	H1-3 ✓
L3	140 - 120 (3)	P36x3/8	0.057	0.458	0.000	0.515 ✓	1.333	H1-3 ✓
L4	120 - 100 (4)	P42x3/8	0.047	0.592	0.000	0.639 ✓	1.333	H1-3 ✓
L5	100 - 80 (5)	P48x3/8	0.040	0.686	0.000	0.726 ✓	1.333	H1-3 ✓
L6	80 - 60 (6)	P54x3/8	0.035	0.756	0.000	0.791 ✓	1.333	H1-3 ✓
L7	60 - 40 (7)	P60x3/8	0.033	0.810	0.000	0.843 ✓	1.333	H1-3 ✓
L8	40 - 20 (8)	P60x1/2	0.031	0.718	0.000	0.748 ✓	1.333	H1-3 ✓
L9	20 - 0 (9)	P60x5/8	0.030	0.662	0.000	0.692 ✓	1.333	H1-3 ✓

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	175 - 160	Pole	P24x3/8	1	-4179.70	87671.54	9.0	Pass
L2	160 - 140	Pole	P30x3/8	2	-9063.84	172854.10	24.7	Pass
L3	140 - 120	Pole	P36x3/8	3	-12777.10	300570.16	38.6	Pass
L4	120 - 100	Pole	P42x3/8	4	-16998.40	479437.42	48.0	Pass
L5	100 - 80	Pole	P48x3/8	5	-21715.00	718068.41	54.5	Pass
L6	80 - 60	Pole	P54x3/8	6	-26926.00	1015362.05	59.3	Pass
L7	60 - 40	Pole	P60x3/8	7	-32630.90	1310139.00	63.2	Pass
L8	40 - 20	Pole	P60x1/2	8	-39928.60	1738858.44	56.1	Pass
L9	20 - 0	Pole	P60x5/8	9	-48505.90	2163592.21	51.9	Pass
							Summary	
						Pole (L7)	63.2	Pass
						RATING =	**63.2**	**Pass**

ANCHOR BOLT AND BASE PLATE ANALYSIS

ANCHOR BOLT AND BASE PLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment:	$OM := 2250 \cdot ft \cdot kips$	*user input*
Shear Force:	$Shear := 21 \cdot kips$	*user input*
Axial Force:	$Axial := 50 \cdot kips$	*user input*

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts = N	$N := 52$	*user input*
Diameter of Bolt Circle:	$D_{bc} := 67in$	*user input*
Bolt "Column" Distance:	$l := 3in$	*user input*
Bolt Ultimate Strength:	$F_u := 150 \cdot ksi$	*user input*
Bolt Yield Strength:	$Fy := 105 \cdot ksi$	*user input*
Bolt Modulus:	$E := 29000 \cdot ksi$	*user input*
Thickness Of Anchor Bolts	$D := 1.25in$	*user input*
Threads per Inch:	$n := 7$	*user input*

Base Plate Data:

Plate Yield Strength:	$Fy_{bp} := 36 \cdot ksi$	*user input*
Base Plate Thickness:	$PlateThickness := 1.5 \cdot in$	*user input*
Base Plate Diameter:	$D_{bp} := 73 \cdot in$	*user input*
Outer Pole Diameter:	$D_{pole} := 60in$	*user input*

Geometric Layout Data:

Distance from the center of gravity of the group to bolt in question = d(i)

Radius of Bolt Circle: $R_{bc} := \frac{D_{bc}}{2}$

Distance to Bolts: $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N}\right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 4.04\,in$ $d_7 = 25.08\,in$

$d_2 = 8.02\,in$ $d_8 = 27.57\,in$

$d_3 = 11.88\,in$ $d_9 = 29.66\,in$

$d_4 = 15.57\,in$ $d_{10} = 31.32\,in$

$d_5 = 19.03\,in$ $d_{11} = 32.53\,in$

$d_6 = 22.21\,in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius: $R_{pole} := \frac{D_{pole}}{2}$ $R_{pole} = 30.00\,in$

Moment Arms of Bolts about Neutral Axis: $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00\,in$ $MA_7 = 0.00\,in$

$MA_2 = 0.00\,in$ $MA_8 = 0.00\,in$

$MA_3 = 0.00\,in$ $MA_9 = 0.00\,in$

$MA_4 = 0.00\,in$ $MA_{10} = 1.32\,in$

$MA_5 = 0.00\,in$ $MA_{11} = 2.53\,in$

$MA_6 = 0.00\,in$ etc.

Effective Width of Baseplate for Bending: $EffectiveWidth := .95 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2}$ $EffectiveWidth = 39.50\,in$

Anchor Bolt Analysis:

Polar Moment of Inertia I_p:

$$I_p := \sum_i \left(d_i\right)^2 \qquad I_p = 2.918 \times 10^4\,in^2$$

Gross Area of Bolt:

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

Net Area of Bolt:

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

Net Diameter:

$$D_n := \frac{2\cdot\sqrt{A_n}}{\sqrt{\pi}} \qquad D_n = 1.11\,in$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4} \qquad r = 0.28\,in$$

Section Modulus of Bolt:

$$S_x := \frac{\pi\cdot D_n^{\,3}}{32} \qquad S_x = 0.135\,in^3$$

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{Shear}{N}\right)\cdot l \qquad M_x = 0.101\,ft\cdot kips$$

$$f_{bx} := \frac{M_x}{S_x} \qquad f_{bx} = 9.0\,ksi$$

Allowable Bending

$$F_{bx} := 1.33\cdot 0.60\cdot Fy \qquad F_{bx} = 83.8\,ksi$$

Note: 1.33 increase allowed per TIA/EIA

Check Tensile Forces:

Allowable Tensile Force:

$AllowableTension := 1.33 \cdot (0.33 \cdot A_g \cdot F_u)$ $\quad AllowableTension = 80.8\,kips$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

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

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{OM \cdot R_{bc}}{I_p} - \frac{Axial}{N} \qquad MaxTension = 30.0\,kips$$

Check Stresses:

$$\frac{MaxTension}{AllowableTension} = 0.37$$

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

Condition = "OK"

Check Compression & Combined Stresses (if required):

Check to see if a complete combined stress analysis is required:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required."

Set the clear space between the plate and bolt to zero and remove bending stresses if a combined stress analysis is not required:

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0.00\,\text{in} & \text{otherwise} \end{cases} \qquad l = 3.00\,\text{in}$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0.0\,\text{ksi} & \text{otherwise} \end{cases} \qquad f_{bx} = 9.0\,\text{ksi}$$

Allowable Compressive Force:

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Fy}} \qquad C_c = 73.84$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^{\,2}}\right] \cdot Fy}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^{\,3}}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} \qquad F_a = 61.4\,\text{ksi}$$

$$F_a := 1.33 \cdot F_a \quad \text{Note: 1.33 increase allowed per TIA/EIA} \qquad F_a = 81.7\,\text{ksi}$$

Applied Compressive Force:

$$\text{MaxCompression} := \frac{OM \cdot R_{bc}}{I_p} + \frac{\text{Axial}}{N} \qquad \text{MaxCompression} = 32.0\,\text{kips}$$

$$f_a := \frac{\text{MaxCompression}}{A_n} \qquad f_a = 33.0\,\text{ksi}$$

Check Combined Stresses:

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} = 0.51$$

$$\text{Condition} := \text{if}\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right) \qquad \boxed{\text{Condition} = \text{"OK"}}$$

Base Plate Analysis:

Force from Bolt(s):

$$C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$$

$C_1 = 4.7\,kips$ $C_7 = 24.2\,kips$

$C_2 = 8.4\,kips$ $C_8 = 26.5\,kips$

$C_3 = 12.0\,kips$ $C_9 = 28.4\,kips$

$C_4 = 15.4\,kips$ $C_{10} = 29.9\,kips$

$C_5 = 18.6\,kips$ $C_{11} = 31.1\,kips$

$C_6 = 21.5\,kips$ etc.

Bending Stress in Plate:

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{EffectiveWidth \cdot PlateThickness^2} \qquad f_{bp} = 37.4\,ksi$$

Check Stresses:

$$\frac{f_{bp}}{1.33 \cdot 0.75 Fy_{bp}} = 1.04$$

$$Condition := if\left(\frac{f_{bp}}{1.33 \cdot 0.75 Fy_{bp}} < 1.00, "OK", "Overstressed"\right)$$

Condition = "Overstressed" Note: Gussets are used

Gusset Spacing:

$$GussetSpacing := \frac{\pi \cdot D_{bc}}{N} \qquad GussetSpacing = 4.0\,in$$

$$GussetLength := \frac{D_{bp} - D_{pole}}{2} \qquad GussetLength = 6.5\,in$$

$$\frac{GussetLength}{GussetSpacing} = 1.6$$

Revised Stress In Plate: (From *Theory of Plates and Shells*, by Timoshenko)

$$f_{bp2} := \frac{6 \cdot \left(.133 \cdot C_{13} + .125 \cdot C_{13}\right)}{PlateThickness^2} \qquad f_{bp2} = 22.0\,ksi$$

Check Revised Stresses:

$$\frac{f_{bp2}}{1.33 \cdot 0.75 Fy_{bp}} = 0.61 \qquad Condition3 := if\left(\frac{f_{bp2}}{1.33 \cdot 0.75 Fy_{bp}} < 1.00, "OK", "Overstressed"\right)$$

Condition3 = "OK"

FOUNDATION ANALYSIS

URS

Job	176' Monopole - Vernon, CT			Page	of
Description	Spread Footing w/ Pier Analysis	Project No.	VZ1-199	Sheet	1 of 9
		Computed by	JEK	Date	07/27/06
		Checked by		Date	

MONOPOLE FOUNDATION ANALYSIS

TOWER FORCES:

Moment Caused by Tower	$M_t := 2150 \cdot ft \cdot kips$
Shear at Base of Tower	$S_t := 21kip$
Max Compressive Force	$C_t := 50 \cdot kip$
Height of Tower	$H_t := 176 \cdot ft$
Base Plate Bolt Circle	$MP := 5.58ft$

FOOTING DIMENSIONS:

Overall Depth of Footing	$D_f := 10ft$
Length of Pier	$L_p := 7.5 \cdot ft$
Extension of Pier Above Grade	$L_{pag} := .5 \cdot ft$
Diameter of Pier	$d_p := 7 \cdot ft$
Thickness of Footing	$T_f := 3 \cdot ft$
Width of Footing:	$W_f := 20ft$
Length of Anchor Bolts:	$L_{st} := 72in$
Projection of anchor bolts above pier	$A_{BP} := 8.5 \cdot in$
Anchor bolts area	$A_{anchor} := 1.23 \cdot in^2$

PROPERTIES:

Compressive Strength of Concrete	$f'c := 3000psi$
Yield Strength of Steel Reinforcement	$fy := 60000 \cdot psi$
Yield Strength of Anchor Bolt	$fya := 105000 \cdot psi$
Internal Friction Angle of Soil	$\phi_s := 30 \cdot deg$
Allowable Bearing Capacity	$q_s := 4800 \cdot psf$
Unit Weight of Soil	$\gamma_s := 120 \cdot pcf$
Unit Weight of Concrete	$\gamma_c := 150 \cdot pcf$
Depth to Neglect	$n := 0ft$
Cohesion of Clay Type Soil Note: Use 0 for Sandy Soil	$c := 0 \cdot ksf$
Seismic Zone Factor: UBC Fig 23-2	$Z := 2$
Coefficient of Friction between soil and Concrete:	$\mu := 0.45$
Clear Cover of Reinforcement Pier:	$Cvr_{pier} := 3 \cdot in$
Clear Cover of Reinforcement Pier:	$Cvr_{pad} := 3 \cdot in$
Anchor Bolt Diameter	$d_{anchor} := 1.25in$

PIER REINFORCEMENT:

Bar Size	$BSpier := 9$	Bar Diameter	$d_{bpier} := 1.128 \cdot in$
Number of Bars	$NBpier := 34$	Bar Area	$A_{bpier} := 1 \cdot in^2$

PAD REINFORCEMENT:

TOP:	Bar Size	$BS_{top} := 8$	Bar Diameter	$d_{btop} := 1.00 \cdot in$
	Number of Bars	$NB_{top} := 23$	Bar Area	$A_{btop} := 0.79 \cdot in^2$
BOTTOM:	Bar Size	$BS_{bot} := 8$	Bar Diameter	$d_{bbot} := 1.00 \cdot in$
	Number of Bars	$NB_{bot} := 23$	Bar Area	$A_{bot} := 0.79 \cdot in^2$

Coefficient of Lateral Soil Pressure: $K_p := \dfrac{1 + \sin(\phi_s)}{1 - \sin(\phi_s)}$ $K_p = 3$

Load Factor (EIA 3.1.1): $LF := if\left[H_t \le 700 \cdot ft, 1.3, if\left[H_t \ge 1200, 1.7, 1.3 + \left(\dfrac{H_t - 700}{1200 - 700}\right) \cdot 0.4\right]\right]$ $LF = 1.3$

URS

Job	176' Monopole - Vernon, CT	Project No.	VZ1-199	Page	___ of ___
Description	Spread Footing w/ Pier Analysis	Computed by	JEK	Sheet	2 of 9
		Checked by		Date	07/27/06

CHECK ANCHOR STEEL EMBEDMENT

Depth:

$D_{ab} := L_{st} - A_{BP}$ $D_{ab} = 5.2917\,ft$ $L_{anchor} := \frac{(0.11 \cdot fy) \cdot in}{\sqrt{f'c \cdot psi}}$ $L_{anchor} = 10.0416\,ft$

$DepthCheck := if(D_{ab} \geq L_{anchor}, "Okay", "No Good")$

$DepthCheck = "No Good"$ **Note:** anchor plate is provided

STABILITY OF FOOTING

Passive Pressure:

$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p}$ $P_{pn} = 0\,ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p}$ $P_{pt} = 2.52\,ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}]$ $P_{top} = 2.52\,ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p}$ $P_{bot} = 3.6\,ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2}$ $P_{ave} = 3.06\,ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)]$ $T_p = 3\,ft$

$A_p := W_f T_p$ $A_p = 60\,ft^2$

Ultimate Shear:

$S_u := P_{ave} \cdot A_p$ $S_u = 183.6\,kip$

Weight of Concrete Pad:

$WT_c := \left[\left(W_f^2 \cdot T_f\right) + d_p^2 L_p\right] \cdot \gamma_c$ $WT_c = 235.125\,kip$

Weight of Soil: above Footing:

$WT_{s1} := \left[W_f^2 \cdot \left(\left|L_p - L_{pag}\right|\right) - \frac{d_p^2 \cdot \pi}{4} \cdot \left(\left|L_p - L_{pag}\right|\right)\right] \cdot \gamma_s$ $WT_{s1} = 303.673\,kip$

Weight of Soil Wedge at back face:

$WT_{s2} := \left(\frac{D_f^2 \cdot \tan(\phi_s)}{2} \cdot W_f\right) \cdot \gamma_s$ $WT_{s2} = 69.282\,kip$

Total Weight:

$WT_{tot} := WT_c + WT_{s1} + C_t$ $WT_{tot} = 588.798\,kip$

Resisting Moment:

$M_r := (WT_{tot}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \cdot \left(W_f + \frac{D_f \tan(\phi_s)}{3}\right)$ $M_r = 7590.5541\,kip \cdot ft$

Overturning Moment:

$M_{ot} := M_t + S_t \cdot (L_p + T_f)$ $M_{ot} = 2370.5\,kip \cdot ft$

Factor of Safety:

$FS := \frac{M_r}{M_{ot}}$ $FS_{req} := 2$ $FS = 3.2$

$SafetyCheck := if(FS > FS_{req}, "Okay", "No Good")$ $SafetyCheck = "Okay"$

SHEAR CAPACITY IN PIER

$FS := 2$

$$S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS}$$

$S_p = 224.2796\,\text{kips}$

$ShearCheck := \text{if}(S_p > S_t, \text{"Okay"}, \text{"No Good"})$

$ShearCheck = \text{"Okay"}$

BEARING PRESSURE CAUSED BY FOOTING

$A_{mat} := W_f^2$ $\quad A_{mat} = 400\,\text{ft}^2$

$S := \frac{W_f^3}{6}$ $\quad S = 1333.3333\,\text{ft}^3$

$P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S}$ $\quad P_{max} = 3.2499\,\text{ksf}$

$P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S}$ $\quad P_{min} = -0.3059\,\text{ksf}$

$MaxPressure := \text{if}(P_{max} < q_s, \text{"Okay"}, \text{"No Good"})$ $\quad MaxPressure = \text{"Okay"}$

$MinPressure := \text{if}\left[(P_{min} \geq 0) \cdot (P_{min} < q_s), \text{"Okay"}, \text{"No Good"}\right]$ $\quad MinPressure = \text{"No Good"}$

Distance to Resultant of Pressure Distribution:

$$X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3}$$

$X_p = 6.0932\,\text{ft}$

Distance to Kern: $X_k := \frac{W_f}{6}$ $\quad X_k = 3.3333\,\text{ft}$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity: $e := \frac{M_{ot}}{WT_{tot}}$ $\quad e = 4.026$

Adjusted Soil Pressure:

$$P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \left(\frac{W_f}{2} - e\right)}$$

$P_a = 3.2853\,\text{ksf}$

$$q_{adj} := \text{if}\left(P_{min} < 0, P_a, \frac{P_{max}}{ft^2}\right)$$

$q_{adj} = 3.2853\,\text{ksf}$

$PressureCheck := \text{if}(q_{adj} < q_s, \text{"Okay"}, \text{"No Good"})$ $\quad PressureCheck = \text{"Okay"}$

CONCRETE BEARING CAPACITY (ACI 10.17)

$\phi_c := 0.75$ (ACI 9.3.2.2)

$P_b := \phi_c \cdot 0.85 \cdot f'c \cdot \frac{d_p^2 \cdot \pi}{4}$ $P_b = 10598.6341\ kip$

$BearingCheck := if(P_b > LF \cdot C_t, "Okay", "No\ Good")$ BearingCheck = "Okay"

SHEAR STRENGTH OF CONCRETE

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_{av} := .85$ (ACI 9.3.2.3)

$d := T_f - Cvr_{pad} - d_{bbot}$ $d = 32\ in$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$ $d_1 = 6.5\ ft$

$d_2 := d_1 - d$ $d_2 = 3.8333\ ft$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$ $L = 17.922\ ft$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$ $Slope = 0.1833\ kcf$

$V_{req} := LF \cdot \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$ $V_{req} = 454.5371\ kip$

ACI 11.3.1.1 $V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f'c \cdot psi} \cdot W_f \cdot d$ $V_{Avail} = 715.1066\ kip$

$BeamShearCheck := if(V_{req} < V_{Avail}, "Okay", "No\ Good")$ BeamShearCheck = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.12.2.1)

$b_o := (d_p + d) \cdot \pi$ $b_o = 30.3687\ ft$

Area included inside bo: $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4}$ $A_{bo} = 73.3911\ ft^2$

Area outside of bo: $A_{out} := A_{mat} - A_{bo}$ $A_{out} = 326.6089\ ft^2$

Guess Value: $v_u := 1\,ksf$ (From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := \text{Find}(v_u)$ $v_u = 7.2707\,ksf$

$V_u := v_u \cdot d \cdot W_f$ $V_u = 387.7682\,kips$

$V_{req} := LF \cdot V_u$ $V_{req} = 504.0986\,kips$

$V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f'c \cdot psi} \cdot b_o \cdot d$ $V_{Avail} = 2171.6878\,kips$

$PunchingShearCheck := \text{if}(V_{req} < V_{Avail}, \text{"Okay"}, \text{"No Good"})$ PunchingShearCheck = "Okay"

STEEL REINFORCEMENT IN THE PAD $\phi_m := .90$ ACI 9.3.2.2

Take Maximum Bending at face of Pier:

$q_b := q_{adj} - d_1 \cdot Slope$ $q_b = 2.0938\,ksf$

$M_n := \frac{LF}{\phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f$ $M_n = 1762.5785\,kip \cdot ft$

ACI 10.2.7.3 $\beta := \text{if}\left[f'c \le 4000 \cdot psi, .85, \text{if}\left[f'c \ge 8000 \cdot psi, .65, .85 - \left(\frac{\frac{f'c}{psi} - 4000}{1000} \right) \cdot .05 \right] \right]$ $\beta = 0.85$

$R_u := \frac{M_n}{\phi_m \cdot W_f \cdot d^2}$ $R_u = 13770.1\,lbf$

$\rho := \frac{0.85 \cdot f'c}{fy} \left(1 - \sqrt{1 - \frac{2 \cdot R_u}{0.85 \cdot f'c}} \right)$ $\rho = 0.0016$

$\rho_{min} := 1.333 \cdot \rho$ $\rho_{min} = 0.00217$

Temperature and Shrinkage: $\rho_{sh} := if(fy \geq 60000 \cdot psi, 0.0018, 0.0020)$ $\rho_{sh} = 0.0018$

(ACI 7.12.2.1b)

FOR BOTTOM BARS: $As := \max(\rho, \rho_{min}, \rho_{sh}) \cdot W_f \cdot d$ $As = 16.6341\ in^2$

$As_{prov} := A_{bot} \cdot NB_{bot}$ $As_{prov} = 18.17\ in^2$

$PadReinforcement := if(As_{prov} > As, "Okay", "No Good")$ $PadReinforcement = "Okay"$

FOR TOP BARS: $As := \rho_{sh} \cdot (W_f \cdot d)$ $As = 13.824\ in^2$

$As_{prov} := A_{btop} \cdot NB_{top}$ $As_{prov} = 18.17\ in^2$

$PadReinforcement := if(As_{prov} > As, "Okay", "No Good")$ $PadReinforcement = "Okay"$

TENSION (ACI 12.2.3) **DEVELOPMENT LENGTH OF PAD REINFORCEMENT**

Bar Spacing: $B_{sPad} := \dfrac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1}$ $B_{sPad} = 9.5909\ in$

Development Length Factors:

Reinforcement Location Factor	$\alpha := 1.0$	
Coating Factor	$\beta := 1.0$	
Concrete strength Factor	$\lambda := 1.0$	
Reinforcement Size Factor	$\gamma := 1.0$	

Spacing or Cover Dimension: $c := if\left(Cvr_{pad} < \dfrac{B_{sPad}}{2}, Cvr_{pad}, \dfrac{B_{sPad}}{2}\right)$ $c = 3\ in$

Transverse Reinforcement Index As allowed by ACI 12.2.4 $k_{tr} := 0$

$L_{dbt} := \dfrac{3}{40} \cdot \dfrac{fy}{\sqrt{fc \cdot psi}} \cdot \dfrac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{\dfrac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot}$ $L_{dbt} = 27.3861\ in$

$L_{dbmin} := 12 \cdot in$

Minimum Development Length (ACI 12.2.1): $L_{dbtCheck} := if(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin")$ $L_{dbtCheck} = "Use\ L.dbt"$

Available Length in Pad: $L_{Pad} := \dfrac{W_f}{2} - \dfrac{d_p}{2} - Cvr_{pad}$ $L_{Pad} = 75\ in$

$LpadTension := if(L_{Pad} > L_{dbt}, "Okay", "No Good")$ $LpadTension = "Okay"$

REINFORCEMENT IN PIER

Pier Area: $A_{pv} := \frac{\pi \cdot d_p^2}{4}$ $A_p = 5541.7694\ in^2$

(ACI 10.8.4 and 10.9.1) $A_{smin} := 0.01 \cdot 0.05 \cdot A_p$ $A_{smin} = 2.7709\ in^2$

$A_{sprov} := NBpier \cdot A_{bpier}$ $A_{sprov} = 34\ in^2$

$SteelAreaCheck := if(A_{sprov} > A_{smin}, "Okay", "No Good")$ SteelAreaCheck = "Okay"

NOTE: Anchor Bolts are not accounted for in reinforcement calculation and will provide additional reinforcement to satisfy minimum requirement of steel.

Bar Spacing In Pier: $B_{sPier} := \frac{d_p \cdot \pi}{NBpier} - d_{bpier}$ $B_{sPier} = 6.6336\ in$

Diamter of Reinforcement Cage: $Diam_{cage} := d_p - 2 \cdot Cvr_{pier}$ $Diam_{cage} = 78\ in$

Maximum Moment in Pier: $M_p := \left[M_t + S_t \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] \cdot LF$ $M_p = 36113.025\ in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

(defined variables) $(f_c\ \ f_y\ \ cl\ \ Spiral) = (3\ \ 60\ \ 3\ \ 0)$

The required input is column diameter in inches, number of reinforcing bars, bar size number, factored axial load in kips and moment in kip inches: $(D\ \ N\ \ n\ \ P_u\ \ M_{xu}) := (84\ \ 34\ \ 9\ \ 50\ \ 36113)$

Clears any previous output: $(\phi P_n\ \ \phi M_{xn}\ \ f_{sp}\ \ \rho) := (0\ \ 0\ \ 0\ \ 0)$

$(\phi P_n\ \ \phi M_{xn}\ \ f_{sp}\ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$

The Output is given as useable axial load in kips, moment capacity in kip inches, splicing stress in ksi, and reinforcement ratio: $(\phi P_n\ \ \phi M_{xn}\ \ f_{sp}\ \ \rho) = (91.7895\ \ 66295.9015\ \ -60\ \ 0.0061)$

Column size and reinforcement may be changed to match capacity to the applied load.

$AxialLoadCheck := if(\phi P_n \geq P_u, "Okay", "No Good")$ AxialLoadCheck = "Okay"

$BendingCheck := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$ BendingCheck = "Okay"

URS

Job	176' Monopole - Vernon, CT	Project No.	VZ1-199	Page	of
Description	Spread Footing w/ Pier Analysis	Computed by	JEK	Sheet	8 of 9
		Checked by		Date	07/27/06

DEVELOPMENT LENGTH OF PIER REINFORCEMENT

TENSION (ACI 12.2.3)

Factors for development:

Reinforcement Location Factor $\alpha := 1.0$

Coating Factor $\beta := 1.0$

Concrete strength Factor $\lambda := 1.0$

Reinforcement Size Factor $\gamma := 1.0$

Spacing or Cover Dimension: $c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right)$ $c = 3\ in$

Transverse Reinforcement: As allowed by ACI 12.2.4 $k_{tr} := 0$

$$L_{dbt} := \frac{3}{40}\cdot\frac{fy}{\sqrt{f'c\cdot psi}}\cdot\frac{\alpha\cdot\beta\cdot\gamma\cdot\lambda}{\frac{c+k_{tr}}{d_{bpier}}}\cdot d_{bpier} \qquad L_{dbt} = 34.8457\ in$$

Minimum Development Length: (ACI 12.2.1) $L_{dbmin} := 12\cdot in$

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$$L_{dh} := \frac{1200\cdot d_{bpier}}{\sqrt{\frac{f'c}{psi}}}\cdot .7 \qquad L_{dh} = 17.2993\ in$$

$$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right) \qquad L_{db} = 34.8457\ in$$

COMPRESSION: (ACI 12.3.2)

$$L_{dbc1} := \frac{.02\cdot d_{bpier}\cdot fy}{\sqrt{f'c\cdot psi}} \qquad L_{dbc1} = 24.7132\ in$$

$$L_{dbmin} := 0.0003\cdot\frac{in^2}{lb}\cdot\left(d_{bpier}\cdot fy\right) \qquad L_{dbmin} = 20.304\ in$$

$$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) \qquad L_{dbc} = 24.7132\ in$$

Available Length in Pier: $L_{pier} := L_p - 3\cdot in$ $L_{pier} = 87\ in$

$L_{piertension} := if\left(L_{pier} > L_{dbt}, "Okay", "No\ Good"\right)$ $L_{piertension} = "Okay"$

$L_{piercompression} := if\left(L_{pier} > L_{dbc}, "Okay", "No\ Good"\right)$

NOTE: Anchor bolts and plate provided, OK

Available Length in Pad: $L_{pad} := T_f - 3\cdot in$ $L_{pad} = 33\ in$

$L_{padtension} := if\left(L_{pad} > L_{dh}, "Okay", "No\ Good"\right)$ $L_{padtension} = "Okay"$

$L_{padcompression} := if\left(L_{pad} > L_{dbc}, "Okay", "No\ Good"\right)$

URS

Job	176' Monopole - Vernon, CT	Project No.	VZ1-199	Page	of
Description	Spread Footing w/ Pier Analysis	Computed by	JEK	Sheet	9 of 9
		Checked by		Date	07/27/06
				Date	

TIE SIZE AND SPACING IN COLUMN

Minimum Tie Size:

$Tie_{min} := if(BSpier \le 10, 3, 4)$ $\quad Tie_{min} = 3$

Used #4 Ties $\quad d_{Tie} := 4$

Seismic factor:
(ACI 21.10.5)

$z := if(Z \le 2, 1, 0.5)$ $\quad z = 1$

$s_{lim1} := 16 \cdot d_{bpier} \cdot z$ $\quad s_{lim1} = 18.048\,in$

$s_{lim2} := \frac{48 \cdot d_{Tie} \cdot in}{8} \cdot z$ $\quad s_{lim2} = 24\,in$

$s_{lim3} := D_f z$ $\quad s_{lim3} = 120\,in$

$s_{lim4} := 18in$ $\quad s_{lim4} = 18\,in$

Maximum Spacing:

$s_{tie} := \min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right)$ $\quad s_{tie} = 18\,in$

Number of Ties Required:

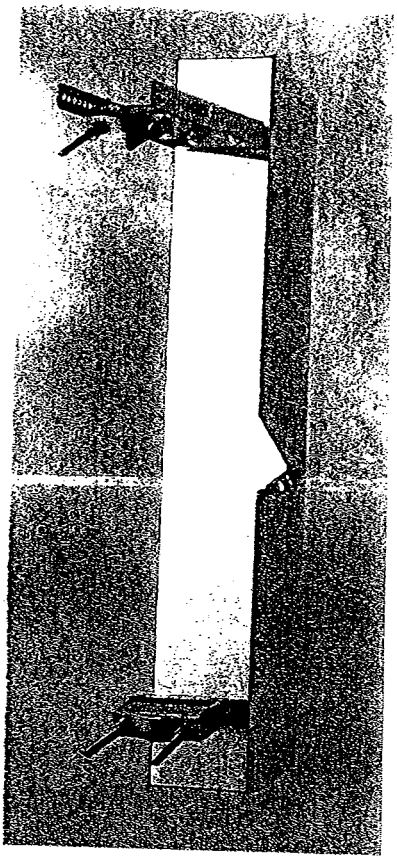
$n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1$ $\quad n_{tie} = 5.6667$

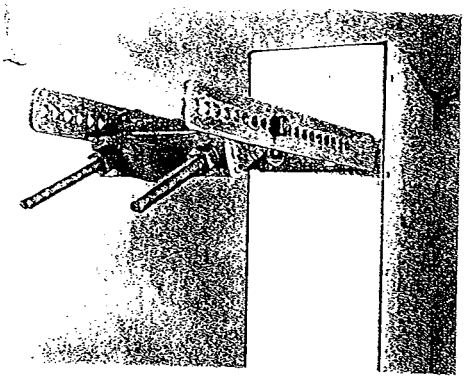
ALP-E 9011-Din

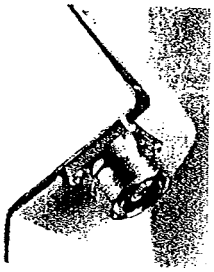
Enhanced Log-Periodic Antenna

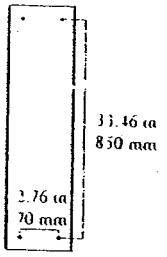
Features:

- ❑ Small Size
- ❑ Aesthetically Pleasing
- ❑ Suitable For TDMA/CDMA
- ❑ High Return Loss
- ❑ Low Intermodulation
- ❑ High FTB
- ❑ Broadbanded
- ❑ Side-lobe Suppression
- ❑ Sturdy Design
- ❑ Down-Tilt Brackets Incl.









The distance between the center of the bolts (on the back of the antenna) are shown in the drawing above.

Bolt diameter is: **3/8-16** [comes with lock nut].

Frequency Range:	**800-900 MHz**
Impedance:	**50 ohm**
Connector Type:	**7/16 Din**
Return Loss:	**20 dB**
Polarization:	**Vertical**
Gain:	**> 11 dBd**
Front To Back Ratio:	**> 30 dB**
Side-Lobe Suppression:	**18 dB**
Intermodulation (2x25W):	**IM3 > 146 dB**
	IM5 > 153 dB
	IM7/9 > 163 dB
Power Rating:	**500 W**
H-Plane (-3 dB point):	**85 - 92°**
V-Plane (-3 dB point):	**16 - 18°**
Lightning Protection:	**DC Grounded**

Overall Height:	**43 in**	**[1092 mm]**
Width:	**6.5 in**	**[165 mm]**
Depth:	**8 in**	**[203 mm]**
Weight Including Tilt-Brackets:	**20 lbs**	**[9.1 Kg]**
Rated Wind Velocity:	**113 mph**	**[180 Km/h]**
Wind Area (CxA/Side):	**2.3 sq. ft.**	**[0.22 sq.m]**
Lateral Thrust At Rated Wind Worst Case:	**112 lbs**	**[500 N]**

Radiating Elements:	**Aluminum**
Extrusion:	**Aluminum**
Radome:	**Grey PVC**
Tilt-Bracket:	**Hot Dip Galvanized Steel**
Antenna Bolts:	**Stainless Steel**

The ALP-E 9011-Din is made in U.S.A.

Vertically Polarized, Panel 90° / 11.5 dBd

WPA-80090/4CF ___

When ordering, replace "___" with connector type.

Mechanical specifications

Length	1205 mm	47.4 in
Width	205 mm	8.1 in
Depth	145 mm	5.7 in
[4] Weight	5.4 kg	12.0 lbs
Wind Area		
Front	0.25 m^2	2.66 ft^2
Side	0.17 m^2	1.88 ft^2
Rated Wind Velocity (Safety factor 2.0)		
	>679 km/hr	>422 mph
Wind load @ 100 mph (161 km/hr)		
Front	362 N	81.4 lbs
Side	264 N	59.4 lbs

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

Mounting & Downtilting:

Mounting brackets attach to a pipe diameter of Ø50-127 mm (2.0-5.0 in)

Mounting bracket kit #36210002

Downtilt bracket kit #36114003

Electrical specifications

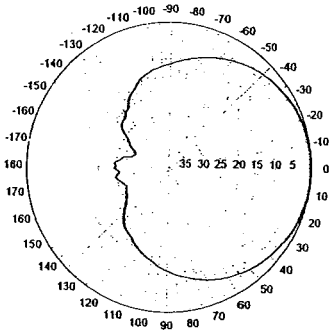
Frequency Range	806-960 MHz
[1] Impedance	50Ω
[3] Connector	NE-E-DIN
[1] VSWR	<1.4:1
Polarization	Vertical
[1] Gain	11.5 dBd
[2] Power Rating	500 W
[1] Half Power Angle	
H-Plane	90°
E-Plane	15°
[1] Electrical Downtilt	0°
[1] Null Fill	10%
Lightning Protection	Direct Ground

Patented Dipole Design: U.S. Patent No. 6,229,496 B1

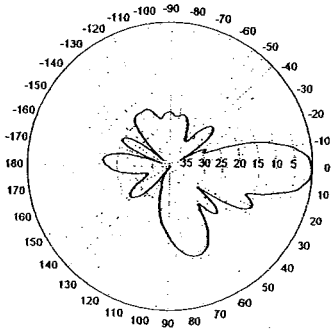
[1] Typical Values
[2] Power Rating limited by connector only
[3] NE indicates an elongated N Connector.
E-DIN indicates an elongated DIN Connector
[4] The antenna weight listed above does not include the bracket weight.

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

Radiation-pattern[1]



Horizontal



Vertical

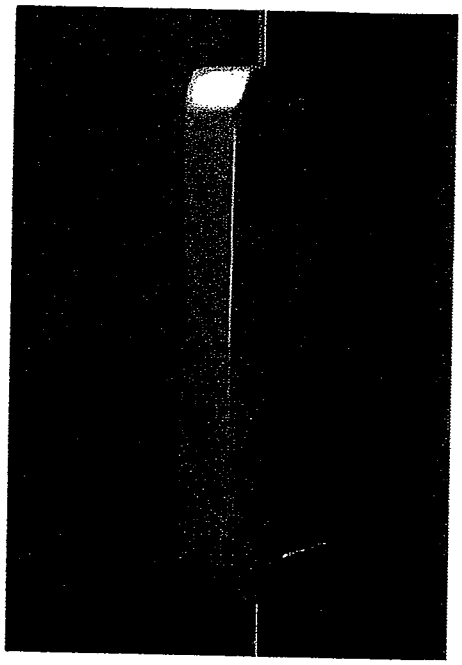
Featuring upper side lobe suppression.

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

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

CF Denotes a Center-Fed Connector.

806-960 MHz



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

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

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

Antenna available with center-fed connector only.

1300 Capital Drive Rockford, IL 61109 Toll-Free (888) 417-9562 Tel. (815) 399-0001
Fax (815) 399-0156 Email: antel@antelinc.com www.antelinc.com

Amphenol Antel, Inc.
The Antenna Technology Company

Revision Date: 6/3/04

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF 147'-6" MONOPOLE FOR NEW ANTENNA ARRANGEMENT

Bright Meadow Boulevard
Enfield, Connecticut

prepared for

verizon wireless

Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

URS

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

36931027.00008
VZ1-202

August 1, 2006

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the 147'-6" monopole located at Bridge Meadow Boulevard in Enfield, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code and the TIA/EIA-222-F standard for a wind velocity of 80 mph (fastest mile) and 69 mph (fastest mile) concurrent with ½" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report. The proposed Verizon Wireless modification is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove: **(6) existing Swedcom ALP-E-9011 antennas** **Install:** **(6) Antel WPA-80090/4CF antennas on existing low profile platform with (6) existing 1 5/8" coax cables**	**Verizon (Proposed)**	**@ 137'**

The results of the analysis indicate that the existing tower structure is in compliance with the proposed loading conditions. **The tower and foundation are considered structurally adequate under the wind load specified above and the existing, and proposed antenna loadings.**

This analysis is based on:

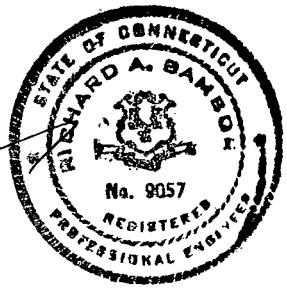
1) The tower structure's theoretical capacity not including any assessment of the condition of the tower.
2) Tower geometry, member sizes and foundation taken from Tower and Foundation reports prepared by Summit Manufacturing, Inc. (Summit Job # 3960) signed and sealed September 18, 1998.
3) Antenna and mount configuration as specified on the following page of this report.

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 AES



Richard A. Sambor, P.E.
Manager Facilities Design

RAS/jek

cc: DR, AA, IA, CF/Book – URS

2. INTRODUCTION

The subject tower is located at Bridge Meadow Boulevard in Enfield, Connecticut. The structure is a 147'-6" monopole manufactured by Summit Manufacturing Incorporated.

The tower geometry and structure member sizes were taken from the original construction drawings (Summit Job # 3960) prepared by Summit Manufacturing Inc., signed and sealed September 18, 1998.

The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Centerline Elevation*	*Cable*
(6) Decibel DB980H90 antennas	Sprint (existing)	Low Profile Platform	147'	(6) 1 5/8" coax cables (within monopole)
(6) Antel WPA-80090/4CF antennas	**Verizon (proposed)**	Low Profile Platform	**137'**	(6) 1 5/8" coax cables (within monopole)
(6) Decibel DB948F85T2E-M antennas	Verizon (existing)	Low Profile Platform (listed above)	137'	(6) 1 5/8" coax cables (within monopole)
(12) Decibel DB844H90 antennas	Nextel (existing)	Low Profile Platform	127'	(12) 7/8" coax cables (within monopole)
(9) Allgon 7184.14 antennas	Cingular Blue (existing)	Low Profile Platform	117'	(9) 1 5/8" coax cables (within monopole)
(1) GPS antenna	(existing)	Sidearm	50'	(1) 1/2" coax cable (within monopole)

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 existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with the 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 analysis was conducted using RISA Tower 4.5. 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 (without ice) + Tower Dead Load
Load Condition 2 = 69 mph (fastest mile Wind Load (with ice) + Ice Load + Tower Dead Load

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

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

4. FINDINGS AND EVALUATION

Combined axial and bending stresses on the monopole structure were evaluated to compare with allowable stresses in accordance with AISC. The calculated stresses under the proposed loading were below the allowable stresses. Detailed analysis and calculations for the proposed load condition are provided in section 6 of this report. Additionally, the anchor bolts, base plate, and foundation were found to be structurally adequate.

5. CONCLUSIONS

The results of the analysis indicate that the tower structure is in compliance with the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the TIA/EIA-222-F wind load classification specified above and all the existing and proposed antenna loading.**

Limitations/Assumptions:

This report is based on the following:

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

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.

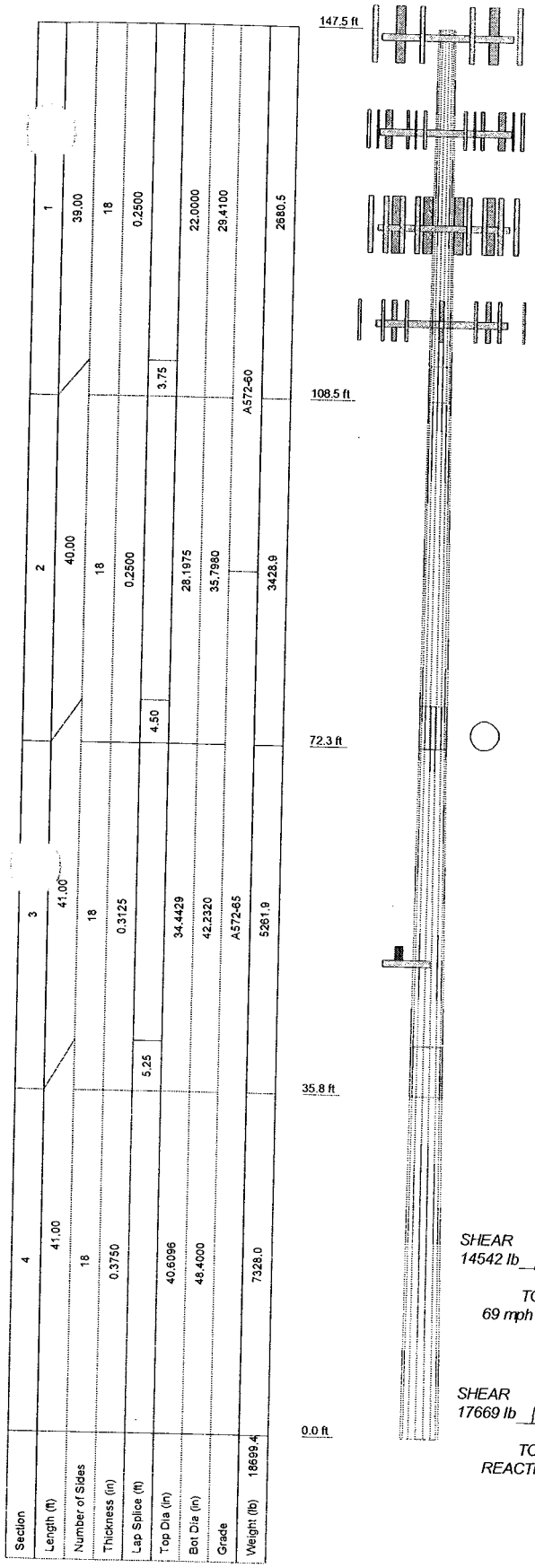
Ongoing and Periodic Inspection and Maintenance:

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

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

6. DRAWINGS AND DATA

RISA TOWER INPUT / OUTPUT SUMMARY



Section	1	2	3	4
Length (ft)	39.00	40.00	41.00	41.00
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.2500	0.3125	0.3750
Lap Splice (ft)	3.75	4.50	5.25	
Top Dia (in)	22.0000	28.1975	34.4429	40.6096
Bot Dia (in)	29.4100	35.7980	42.2320	48.4000
Grade	A572-60	A572-60	A572-65	A572-65
Weight (lb)	2680.5	3428.9	5261.9	7328.0

Total Weight: 18699.4

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) Decibel DB980H90 (Sprint)	147	WPA-80090/4CF (Verizon)	137
(2) Decibel DB980H90 (Sprint)	147	Summit 14' Low Profile Platform (Verizon)	137
(2) Decibel DB980H90 (Sprint)	147	(4) DB844H90 (Nextel)	127
Summit 14' Low Profile Platform (Sprint)	147	(4) DB844H90 (Nextel)	127
DB948F85T2E-M (Verizon)	137	(4) DB844H90 (Nextel)	127
DB948F85T2E-M (Verizon)	137	Summit 14' Low Profile Platform (Nextel)	127
DB948F85T2E-M (Verizon)	137	(3) 7184.14 (Cingular Blue)	117
DB948F85T2E-M (Verizon)	137	(3) 7184.14 (Cingular Blue)	117
DB948F85T2E-M (Verizon)	137	(3) 7184.14 (Cingular Blue)	117
WPA-80090/4CF (Verizon)	137	Summit 14' Low Profile Platform (Cingular Blue)	117
WPA-80090/4CF (Verizon)	137	GPS	50
WPA-80090/4CF (Verizon)	137	Sabre 2' Sidearm	50
WPA-80090/4CF (Verizon)	137		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-60	60 ksi	75 ksi	A572-65	65 ksi	80 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 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 67.2%

URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: (850) 529-8882
FAX: (860) 529-3991

Job:	*147.5' Summit Monopole*
Project:	*Bright Meadow Boulevard Enfield, CT*
Client: Verizon Wireless	Drawn by: Staff / App'd:
Code: TIA/EIA-222-F	Date: 08/01/06 / Scale: NTS
Path: P:\08\ERI\Files\147.5 Monopole.eri	Dwg No. E-1

RISA TOWER DETAILED OUTPUT

Tower Input Data

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

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 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	147.50-108.50	39.00	3.75	18	22.0000	29.4100	0.2500	1.0000	A572-60 (60 ksi)
L2	108.50-72.25	40.00	4.50	18	28.1975	35.7980	0.2500	1.0000	A572-65 (65 ksi)
L3	72.25-35.75	41.00	5.25	18	34.4429	42.2320	0.3125	1.2500	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L4	35.75-0.00	41.00		18	40.6096	48.4000	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.3394	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	29.8637	23.1385	2485.6899	10.3518	14.9403	166.3751	4974.6504	11.5714	4.7362	18.945
L2	29.3560	22.1763	2188.3323	9.9214	14.3243	152.7703	4379.5441	11.0903	4.5228	18.091
	36.3502	28.2073	4503.2898	12.6195	18.1854	247.6324	9012.5051	14.1063	5.8604	23.442
L3	35.8424	33.8531	4982.1891	12.1163	17.4970	284.7451	9970.9339	16.9298	5.5120	17.638
	42.8835	41.5789	9230.8709	14.8814	21.4539	430.2663	18473.8880	20.7934	6.8828	22.025
L4	42.2490	47.8893	9794.3447	14.2833	20.6297	474.7694	19601.5771	23.9492	6.4873	17.299
	49.1466	57.1618	16656.2703	17.0489	24.5872	677.4366	33334.4574	28.5863	7.8584	20.956

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 147.50-108.50				1	1	1		
L2 108.50-72.25				1	1	1		
L3 72.25-35.75				1	1	1		
L4 35.75-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 5/8 (Sprint)	C	No	Inside Pole	147.00 - 3.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
7/8 (Nextel)	C	No	Inside Pole	127.00 - 10.00	12	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
1 5/8 (Verizon)	C	No	Inside Pole	137.00 - 10.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Cingular Blue)	C	No	Inside Pole	117.00 - 4.00	9	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1/2 (GPS)	C	No	Inside Pole	50.00 - 10.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25

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 lb

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 lb
L1	147.50-108.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	795.36
L2	108.50-72.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1252.80
L3	72.25-35.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1265.00
L4	35.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	996.20

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 lb
L1	147.50-108.50	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	795.36
L2	108.50-72.25	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1252.80
L3	72.25-35.75	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1265.00
L4	35.75-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	996.20

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	147.50-108.50	0.0000	0.0000	0.0000	0.0000
L2	108.50-72.25	0.0000	0.0000	0.0000	0.0000
L3	72.25-35.75	0.0000	0.0000	0.0000	0.0000
L4	35.75-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft ft ft	°	ft		ft^2	ft^2	lb
(2) Decibel DB980H90 (Sprint)	A	From Leg	5.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice	3.75 4.32	3.75 4.32	13.00 32.00
(2) Decibel DB980H90 (Sprint)	B	From Leg	5.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice	3.75 4.32	3.75 4.32	13.00 32.00
(2) Decibel DB980H90 (Sprint)	C	From Leg	5.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice	3.75 4.32	3.75 4.32	13.00 32.00
Summit 14' Low Profile Platform (Sprint)	C	None		0.0000	147.00	No Ice 1/2" Ice	20.00 25.00	20.00 25.00	1300.00 1500.00
DB948F85T2E-M (Verizon)	A	From Leg	5.00 4.00 0.00	0.0000	137.00	No Ice 1/2" Ice	1.92 2.22	3.26 3.62	8.50 27.57
DB948F85T2E-M (Verizon)	A	From Leg	5.00 -4.00 0.00	0.0000	137.00	No Ice 1/2" Ice	1.92 2.22	3.26 3.62	8.50 27.57
DB948F85T2E-M (Verizon)	B	From Leg	5.00 4.00 0.00	0.0000	137.00	No Ice 1/2" Ice	1.92 2.22	3.26 3.62	8.50 27.57
DB948F85T2E-M (Verizon)	B	From Leg	5.00 -4.00 0.00	0.0000	137.00	No Ice 1/2" Ice	1.92 2.22	3.26 3.62	8.50 27.57
DB948F85T2E-M (Verizon)	C	From Leg	5.00 4.00 0.00	0.0000	137.00	No Ice 1/2" Ice	1.92 2.22	3.26 3.62	8.50 27.57
DB948F85T2E-M (Verizon)	C	From Leg	5.00 -4.00 0.00	0.0000	137.00	No Ice 1/2" Ice	1.92 2.22	3.26 3.62	8.50 27.57
WPA-80090/4CF (Verizon)	A	From Leg	5.00 6.00 0.00	0.0000	137.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	12.00 36.71
WPA-80090/4CF (Verizon)	A	From Leg	5.00 -6.00 0.00	0.0000	137.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	12.00 36.71
WPA-80090/4CF (Verizon)	B	From Leg	5.00 6.00 0.00	0.0000	137.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	12.00 36.71
WPA-80090/4CF (Verizon)	B	From Leg	5.00 -6.00 0.00	0.0000	137.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	12.00 36.71
WPA-80090/4CF (Verizon)	C	From Leg	5.00 6.00 0.00	0.0000	137.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	12.00 36.71
WPA-80090/4CF (Verizon)	C	From Leg	5.00 -6.00 0.00	0.0000	137.00	No Ice 1/2" Ice	3.73 4.10	2.71 3.01	12.00 36.71
Summit 14' Low Profile Platform (Verizon)	C	None		0.0000	137.00	No Ice 1/2" Ice	20.00 25.00	20.00 25.00	1300.00 1500.00
(4) DB844H90 (Nextel)	A	From Leg	5.00 0.00 0.00	0.0000	127.00	No Ice 1/2" Ice	2.87 3.18	3.97 4.34	10.00 36.27
(4) DB844H90 (Nextel)	B	From Leg	5.00 0.00 0.00	0.0000	127.00	No Ice 1/2" Ice	2.87 3.18	3.97 4.34	10.00 36.27

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 lb
(4) DB844H90 (Nextel)	C	From Leg	5.00 0.00 0.00	0.0000	127.00	No Ice 1/2" Ice	2.87 3.18	3.97 4.34	10.00 36.27
Summit 14' Low Profile Platform (Nextel)	C	None		0.0000	127.00	No Ice 1/2" Ice	20.00 25.00	20.00 25.00	1300.00 1500.00
(3) 7184.14 (Cingular Blue)	A	From Leg	6.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice	2.85 3.18	1.43 1.75	9.70 24.29
(3) 7184.14 (Cingular Blue)	B	From Leg	6.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice	2.85 3.18	1.43 1.75	9.70 24.29
(3) 7184.14 (Cingular Blue)	C	From Leg	6.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice	2.85 3.18	1.43 1.75	9.70 24.29
Summit 14' Low Profile Platform (Cingular Blue)	A	None		0.0000	117.00	No Ice 1/2" Ice	20.00 25.00	20.00 25.00	1300.00 1500.00
GPS	C	From Leg	2.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	10.00 15.00
Sabre 2' Sidearm	C	From Leg	1.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	3.90 4.40	3.90 4.40	87.00 97.00

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 147.50-108.50	127.27	1.471	24	83.541	A	0.000	83.541	83.541	100.00	0.000	0.000
					B	0.000	83.541		100.00		
					C	0.000	83.541		100.00		
L2 108.50-72.25	89.99	1.332	22	97.736	A	0.000	97.736	97.736	100.00	0.000	0.000
					B	0.000	97.736		100.00		
					C	0.000	97.736		100.00		
L3 72.25-35.75	53.90	1.15	19	117.910	A	0.000	117.910	117.910	100.00	0.000	0.000
					B	0.000	117.910		100.00		
					C	0.000	117.910		100.00		
L4 35.75-0.00	17.43	1	16	134.073	A	0.000	134.073	134.073	100.00	0.000	0.000
					B	0.000	134.073		100.00		
					C	0.000	134.073		100.00		

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation	z	K_Z	q_z	t_Z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
L1 147.50-108.50	127.27	1.471	18	0.5000	86.791	A	0.000	86.791	86.791	100.00	0.000	0.000
						B	0.000	86.791		100.00		
						C	0.000	86.791		100.00		
L2 108.50-72.25	89.99	1.332	16	0.5000	100.757	A	0.000	100.757	100.757	100.00	0.000	0.000
						B	0.000	100.757		100.00		
						C	0.000	100.757		100.00		
L3 72.25-35.75	53.90	1.15	14	0.5000	120.952	A	0.000	120.952	120.952	100.00	0.000	0.000
						B	0.000	120.952		100.00		
						C	0.000	120.952		100.00		
L4 35.75-0.00	17.43	1	12	0.5000	137.052	A	0.000	137.052	137.052	100.00	0.000	0.000
						B	0.000	137.052		100.00		
						C	0.000	137.052		100.00		

Tower Pressure - Service

$G_H = 1.690$

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
L1 147.50-108.50	127.27	1.471	9	83.541	A	0.000	83.541	83.541	100.00	0.000	0.000
					B	0.000	83.541		100.00		
					C	0.000	83.541		100.00		
L2 108.50-72.25	89.99	1.332	9	97.736	A	0.000	97.736	97.736	100.00	0.000	0.000
					B	0.000	97.736		100.00		
					C	0.000	97.736		100.00		
L3 72.25-35.75	53.90	1.15	7	117.910	A	0.000	117.910	117.910	100.00	0.000	0.000
					B	0.000	117.910		100.00		
					C	0.000	117.910		100.00		
L4 35.75-0.00	17.43	1	6	134.073	A	0.000	134.073	134.073	100.00	0.000	0.000
					B	0.000	134.073		100.00		
					C	0.000	134.073		100.00		

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	lb	lb							ft^2	lb	plf	
L1 147.50-108.50	795.36	2680.51	A	1	0.65	1	1	1	83.541	2208.77	56.64	C
			B	1	0.65	1	1	1	83.541			
			C	1	0.65	1	1	1	83.541			
L2 108.50-72.25	1252.80	3428.89	A	1	0.65	1	1	1	97.736	2338.57	64.51	C
			B	1	0.65	1	1	1	97.736			
			C	1	0.65	1	1	1	97.736			
L3 72.25-35.75	1265.00	5261.91	A	1	0.65	1	1	1	117.910	2428.46	66.53	C
			B	1	0.65	1	1	1	117.910			
			C	1	0.65	1	1	1	117.910			
L4 35.75-0.00	996.20	7328.04	A	1	0.65	1	1	1	134.073	2413.03	67.50	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			B	1	0.65	1	1	1	134.073			
			C	1	0.65	1	1	1	134.073			
Sum Weight:	4309.36	18699.35						OTM	664516.44 lb-ft	9388.82		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	2680.51	A	1	0.65	1	1	1	83.541	2208.77	56.64	C
			B	1	0.65	1	1	1	83.541			
			C	1	0.65	1	1	1	83.541			
L2 108.50-72.25	1252.80	3428.89	A	1	0.65	1	1	1	97.736	2338.57	64.51	C
			B	1	0.65	1	1	1	97.736			
			C	1	0.65	1	1	1	97.736			
L3 72.25-35.75	1265.00	5261.91	A	1	0.65	1	1	1	117.910	2428.46	66.53	C
			B	1	0.65	1	1	1	117.910			
			C	1	0.65	1	1	1	117.910			
L4 35.75-0.00	996.20	7328.04	A	1	0.65	1	1	1	134.073	2413.03	67.50	C
			B	1	0.65	1	1	1	134.073			
			C	1	0.65	1	1	1	134.073			
Sum Weight:	4309.36	18699.35						OTM	664516.44 lb-ft	9388.82		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	2680.51	A	1	0.65	1	1	1	83.541	2208.77	56.64	C
			B	1	0.65	1	1	1	83.541			
			C	1	0.65	1	1	1	83.541			
L2 108.50-72.25	1252.80	3428.89	A	1	0.65	1	1	1	97.736	2338.57	64.51	C
			B	1	0.65	1	1	1	97.736			
			C	1	0.65	1	1	1	97.736			
L3 72.25-35.75	1265.00	5261.91	A	1	0.65	1	1	1	117.910	2428.46	66.53	C
			B	1	0.65	1	1	1	117.910			
			C	1	0.65	1	1	1	117.910			
L4 35.75-0.00	996.20	7328.04	A	1	0.65	1	1	1	134.073	2413.03	67.50	C
			B	1	0.65	1	1	1	134.073			
			C	1	0.65	1	1	1	134.073			
Sum Weight:	4309.36	18699.35						OTM	664516.44 lb-ft	9388.82		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	2680.51	A	1	0.65	1	1	1	83.541	2208.77	56.64	C
			B	1	0.65	1	1	1	83.541			
			C	1	0.65	1	1	1	83.541			
L2 108.50-72.25	1252.80	3428.89	A	1	0.65	1	1	1	97.736	2338.57	64.51	C
			B	1	0.65	1	1	1	97.736			
			C	1	0.65	1	1	1	97.736			
L3 72.25-35.75	1265.00	5261.91	A	1	0.65	1	1	1	117.910	2428.46	66.53	C
			B	1	0.65	1	1	1	117.910			
			C	1	0.65	1	1	1	117.910			
L4 35.75-0.00	996.20	7328.04	A	1	0.65	1	1	1	134.073	2413.03	67.50	C
			B	1	0.65	1	1	1	134.073			
			C	1	0.65	1	1	1	134.073			
Sum Weight:	4309.36	18699.35						OTM	664516.44 lb-ft	9388.82		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	3311.26	A	1	0.65	1	1	1	86.791	1721.02	44.13	C
			B	1	0.65	1	1	1	86.791			
			C	1	0.65	1	1	1	86.791			
L2 108.50-72.25	1252.80	4163.91	A	1	0.65	1	1	1	100.757	1808.13	49.88	C
			B	1	0.65	1	1	1	100.757			
			C	1	0.65	1	1	1	100.757			
L3 72.25-35.75	1265.00	6146.41	A	1	0.65	1	1	1	120.952	1868.32	51.19	C
			B	1	0.65	1	1	1	120.952			
			C	1	0.65	1	1	1	120.952			
L4 35.75-0.00	996.20	8332.02	A	1	0.65	1	1	1	137.052	1849.98	51.75	C
			B	1	0.65	1	1	1	137.052			
			C	1	0.65	1	1	1	137.052			
Sum Weight:	4309.36	21953.59						OTM	514700.89 lb-ft	7247.46		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	3311.26	A	1	0.65	1	1	1	86.791	1721.02	44.13	C
			B	1	0.65	1	1	1	86.791			
			C	1	0.65	1	1	1	86.791			
L2 108.50-72.25	1252.80	4163.91	A	1	0.65	1	1	1	100.757	1808.13	49.88	C
			B	1	0.65	1	1	1	100.757			
			C	1	0.65	1	1	1	100.757			
L3 72.25-35.75	1265.00	6146.41	A	1	0.65	1	1	1	120.952	1868.32	51.19	C
			B	1	0.65	1	1	1	120.952			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	1	0.65	1	1	1	120.952			
L4 35.75-0.00	996.20	8332.02	A	1	0.65	1	1	1	137.052	1849.98	51.75	C
			B	1	0.65	1	1	1	137.052			
			C	1	0.65	1	1	1	137.052			
Sum Weight:	4309.36	21953.59						OTM	514700.89 lb-ft	7247.46		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	3311.26	A	1	0.65	1	1	1	86.791	1721.02	44.13	C
			B	1	0.65	1	1	1	86.791			
			C	1	0.65	1	1	1	86.791			
L2 108.50-72.25	1252.80	4163.91	A	1	0.65	1	1	1	100.757	1808.13	49.88	C
			B	1	0.65	1	1	1	100.757			
			C	1	0.65	1	1	1	100.757			
L3 72.25-35.75	1265.00	6146.41	A	1	0.65	1	1	1	120.952	1868.32	51.19	C
			B	1	0.65	1	1	1	120.952			
			C	1	0.65	1	1	1	120.952			
L4 35.75-0.00	996.20	8332.02	A	1	0.65	1	1	1	137.052	1849.98	51.75	C
			B	1	0.65	1	1	1	137.052			
			C	1	0.65	1	1	1	137.052			
Sum Weight:	4309.36	21953.59						OTM	514700.89 lb-ft	7247.46		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	3311.26	A	1	0.65	1	1	1	86.791	1721.02	44.13	C
			B	1	0.65	1	1	1	86.791			
			C	1	0.65	1	1	1	86.791			
L2 108.50-72.25	1252.80	4163.91	A	1	0.65	1	1	1	100.757	1808.13	49.88	C
			B	1	0.65	1	1	1	100.757			
			C	1	0.65	1	1	1	100.757			
L3 72.25-35.75	1265.00	6146.41	A	1	0.65	1	1	1	120.952	1868.32	51.19	C
			B	1	0.65	1	1	1	120.952			
			C	1	0.65	1	1	1	120.952			
L4 35.75-0.00	996.20	8332.02	A	1	0.65	1	1	1	137.052	1849.98	51.75	C
			B	1	0.65	1	1	1	137.052			
			C	1	0.65	1	1	1	137.052			
Sum Weight:	4309.36	21953.59						OTM	514700.89 lb-ft	7247.46		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	2680.51	A	1	0.65	1	1	1	83.541	862.80	22.12	C
			B	1	0.65	1	1	1	83.541			
			C	1	0.65	1	1	1	83.541			
L2 108.50-72.25	1252.80	3428.89	A	1	0.65	1	1	1	97.736	913.50	25.20	C
			B	1	0.65	1	1	1	97.736			
			C	1	0.65	1	1	1	97.736			
L3 72.25-35.75	1265.00	5261.91	A	1	0.65	1	1	1	117.910	948.62	25.99	C
			B	1	0.65	1	1	1	117.910			
			C	1	0.65	1	1	1	117.910			
L4 35.75-0.00	996.20	7328.04	A	1	0.65	1	1	1	134.073	942.59	26.37	C
			B	1	0.65	1	1	1	134.073			
			C	1	0.65	1	1	1	134.073			
Sum Weight:	4309.36	18699.35						OTM	259576.73 lb-ft	3667.51		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	2680.51	A	1	0.65	1	1	1	83.541	862.80	22.12	C
			B	1	0.65	1	1	1	83.541			
			C	1	0.65	1	1	1	83.541			
L2 108.50-72.25	1252.80	3428.89	A	1	0.65	1	1	1	97.736	913.50	25.20	C
			B	1	0.65	1	1	1	97.736			
			C	1	0.65	1	1	1	97.736			
L3 72.25-35.75	1265.00	5261.91	A	1	0.65	1	1	1	117.910	948.62	25.99	C
			B	1	0.65	1	1	1	117.910			
			C	1	0.65	1	1	1	117.910			
L4 35.75-0.00	996.20	7328.04	A	1	0.65	1	1	1	134.073	942.59	26.37	C
			B	1	0.65	1	1	1	134.073			
			C	1	0.65	1	1	1	134.073			
Sum Weight:	4309.36	18699.35						OTM	259576.73 lb-ft	3667.51		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	2680.51	A	1	0.65	1	1	1	83.541	862.80	22.12	C
			B	1	0.65	1	1	1	83.541			
			C	1	0.65	1	1	1	83.541			
L2 108.50-72.25	1252.80	3428.89	A	1	0.65	1	1	1	97.736	913.50	25.20	C
			B	1	0.65	1	1	1	97.736			
			C	1	0.65	1	1	1	97.736			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L3 72.25-35.75	1265.00	5261.91	A	1	0.65	1	1	1	117.910	948.62	25.99	C
			B	1	0.65	1	1	1	117.910			
			C	1	0.65	1	1	1	117.910			
L4 35.75-0.00	996.20	7328.04	A	1	0.65	1	1	1	134.073	942.59	26.37	C
			B	1	0.65	1	1	1	134.073			
			C	1	0.65	1	1	1	134.073			
Sum Weight:	4309.36	18699.35						OTM	259576.73 lb-ft	3667.51		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.50-108.50	795.36	2680.51	A	1	0.65	1	1	1	83.541	862.80	22.12	C
			B	1	0.65	1	1	1	83.541			
			C	1	0.65	1	1	1	83.541			
L2 108.50-72.25	1252.80	3428.89	A	1	0.65	1	1	1	97.736	913.50	25.20	C
			B	1	0.65	1	1	1	97.736			
			C	1	0.65	1	1	1	97.736			
L3 72.25-35.75	1265.00	5261.91	A	1	0.65	1	1	1	117.910	948.62	25.99	C
			B	1	0.65	1	1	1	117.910			
			C	1	0.65	1	1	1	117.910			
L4 35.75-0.00	996.20	7328.04	A	1	0.65	1	1	1	134.073	942.59	26.37	C
			B	1	0.65	1	1	1	134.073			
			C	1	0.65	1	1	1	134.073			
Sum Weight:	4309.36	18699.35						OTM	259576.73 lb-ft	3667.51		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	18699.35					
Bracing Weight	0.00					
Total Member Self-Weight	18699.35			133.37	231.01	
Total Weight	28714.01			133.37	231.01	
Wind 0 deg - No Ice		0.00	-17668.66	-1747431.83	231.01	-377.21
Wind 30 deg - No Ice		8834.33	-15301.51	-1513302.49	-873551.59	-217.78
Wind 45 deg - No Ice		12493.63	-12493.63	-1235581.83	-1235484.20	-112.73
Wind 60 deg - No Ice		15301.51	-8834.33	-873649.23	-1513204.85	0.00
Wind 90 deg - No Ice		17668.66	0.00	133.37	-1747334.20	217.78
Wind 120 deg - No Ice		15301.51	8834.33	873915.98	-1513204.85	377.21
Wind 135 deg - No Ice		12493.63	12493.63	1235848.58	-1235484.20	420.72
Wind 150 deg - No Ice		8834.33	15301.51	1513569.24	-873551.59	435.56
Wind 180 deg - No Ice		0.00	17668.66	1747698.58	231.01	377.21
Wind 210 deg - No Ice		-8834.33	15301.51	1513569.24	874013.61	217.78
Wind 225 deg - No Ice		-12493.63	12493.63	1235848.58	1235946.22	112.73

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 240 deg - No Ice		-15301.51	8834.33	873915.98	1513666.87	0.00
Wind 270 deg - No Ice		-17668.66	0.00	133.37	1747796.22	-217.78
Wind 300 deg - No Ice		-15301.51	-8834.33	-873649.23	1513666.87	-377.21
Wind 315 deg - No Ice		-12493.63	-12493.63	-1235581.83	1235946.22	-420.72
Wind 330 deg - No Ice		-8834.33	-15301.51	-1513302.49	874013.61	-435.56
Member Ice	3254.24					
Total Weight Ice	33606.42			155.72	269.72	
Wind 0 deg - Ice		0.00	-14542.40	-1468634.47	269.72	-346.64
Wind 30 deg - Ice		7271.20	-12594.08	-1271853.89	-734125.37	-200.13
Wind 45 deg - Ice		10283.03	-10283.03	-1038435.78	-1038321.78	-103.59
Wind 60 deg - Ice		12594.08	-7271.20	-734239.37	-1271739.90	0.00
Wind 90 deg - Ice		14542.40	0.00	155.72	-1468520.47	200.13
Wind 120 deg - Ice		12594.08	7271.20	734550.82	-1271739.90	346.64
Wind 135 deg - Ice		10283.03	10283.03	1038747.23	-1038321.78	386.62
Wind 150 deg - Ice		7271.20	12594.08	1272165.34	-734125.37	400.26
Wind 180 deg - Ice		0.00	14542.40	1468945.92	269.72	346.64
Wind 210 deg - Ice		-7271.20	12594.08	1272165.34	734664.82	200.13
Wind 225 deg - Ice		-10283.03	10283.03	1038747.23	1038861.23	103.59
Wind 240 deg - Ice		-12594.08	7271.20	734550.82	1272279.34	0.00
Wind 270 deg - Ice		-14542.40	0.00	155.72	1469059.91	-200.13
Wind 300 deg - Ice		-12594.08	-7271.20	-734239.37	1272279.34	-346.64
Wind 315 deg - Ice		-10283.03	-10283.03	-1038435.78	1038861.23	-386.62
Wind 330 deg - Ice		-7271.20	-12594.08	-1271853.89	734664.82	-400.26
Total Weight	28714.01			133.37	231.01	
Wind 0 deg - Service		0.00	-6901.82	-682509.29	231.01	-147.35
Wind 30 deg - Service		3450.91	-5977.15	-591052.51	-341090.32	-85.07
Wind 45 deg - Service		4880.32	-4880.32	-482567.88	-482470.24	-44.04
Wind 60 deg - Service		5977.15	-3450.91	-341187.96	-590954.88	0.00
Wind 90 deg - Service		6901.82	0.00	133.37	-682411.65	85.07
Wind 120 deg - Service		5977.15	3450.91	341454.70	-590954.88	147.35
Wind 135 deg - Service		4880.32	4880.32	482834.63	-482470.24	164.34
Wind 150 deg - Service		3450.91	5977.15	591319.26	-341090.32	170.14
Wind 180 deg - Service		0.00	6901.82	682776.03	231.01	147.35
Wind 210 deg - Service		-3450.91	5977.15	591319.26	341552.34	85.07
Wind 225 deg - Service		-4880.32	4880.32	482834.63	482932.26	44.04
Wind 240 deg - Service		-5977.15	3450.91	341454.70	591416.89	0.00
Wind 270 deg - Service		-6901.82	0.00	133.37	682873.67	-85.07
Wind 300 deg - Service		-5977.15	-3450.91	-341187.96	591416.89	-147.35
Wind 315 deg - Service		-4880.32	-4880.32	-482567.88	482932.26	-164.34
Wind 330 deg - Service		-3450.91	-5977.15	-591052.51	341552.34	-170.14

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

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

Maximum Member Forces

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Force lb*	*Major Axis Moment lb-ft*	*Minor Axis Moment lb-ft*
L1	147.5 - 108.5	Pole	Max Tension	47	0.00	-0.00	0.00
			Max. Compression	18	-10901.55	0.00	0.00
			Max. Mx	14	-8035.86	207573.15	-1.61
			Max. My	10	-8035.89	2.79	-207572.83
			Max. Vy	14	-10651.18	207573.15	-1.61
			Max. Vx	10	10651.16	2.79	-207572.83
			Max. Torque	9			0.01
L2	108.5 - 72.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-16072.92	0.00	0.00
			Max. Mx	14	-12626.69	626460.18	-4.94
			Max. My	10	-12626.71	8.56	-626459.10
			Max. Vy	14	-12936.22	626460.18	-4.94
			Max. Vx	10	12936.19	8.56	-626459.10
			Max. Torque	9			0.18

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L3	72.25 - 35.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-23225.46	269.72	-155.72
			Max. Mx	14	-19140.07	1131488.24	-136.17
			Max. My	10	-19140.09	235.85	- 1131388.44
			Max. Vy	14	-15328.03	1131488.24	-136.17
			Max. Vx	10	15328.00	235.85	- 1131388.44
			Max. Torque	17			435.74
L4	35.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-33606.42	269.72	-155.72
			Max. Mx	14	-28705.00	1808584.84	-136.97
			Max. My	10	-28705.00	237.24	- 1808484.36
			Max. Vy	14	-17683.30	1808584.84	-136.97
			Max. Vx	10	17683.30	237.24	- 1808484.36
			Max. Torque	17			435.46

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	31	33606.42	14542.41	-0.00
	Max. H_x	14	28714.01	17668.67	-0.00
	Max. H_z	2	28714.01	0.00	17668.67
	Max. M_x	2	1808209.86	0.00	17668.67
	Max. M_z	6	1808109.38	-17668.67	-0.00
	Max. Torsion	17	435.27	8834.33	15301.51
	Min. Vert	1	28714.01	0.00	0.00
	Min. H_x	6	28714.01	-17668.67	-0.00
	Min. H_z	10	28714.01	0.00	-17668.67
	Min. M_x	10	-1808484.36	0.00	-17668.67
	Min. M_z	14	-1808584.84	17668.67	-0.00
	Min. Torsion	9	-435.26	-8834.33	-15301.51

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	28714.01	0.00	0.00	133.37	231.01	0.00
Dead+Wind 0 deg - No Ice	28714.01	-0.00	-17668.67	-1808209.86	237.18	-376.95
Dead+Wind 30 deg - No Ice	28714.01	8834.33	-15301.51	-1565941.12	-903938.42	-217.62
Dead+Wind 45 deg - No Ice	28714.01	12493.63	-12493.63	-1278560.41	-1278460.17	-112.65
Dead+Wind 60 deg - No Ice	28714.01	15301.51	-8834.33	-904038.62	-1565840.81	-0.01
Dead+Wind 90 deg - No Ice	28714.01	17668.67	0.00	136.94	-1808109.38	217.63
Dead+Wind 120 deg - No Ice	28714.01	15301.51	8834.33	904312.65	-1565841.08	376.96
Dead+Wind 135 deg - No Ice	28714.01	12493.63	12493.63	1278834.60	-1278460.48	420.43
Dead+Wind 150 deg - No Ice	28714.01	8834.33	15301.51	1566215.47	-903938.70	435.26
Dead+Wind 180 deg - No Ice	28714.01	-0.00	17668.67	1808484.36	237.18	376.95
Dead+Wind 210 deg - No Ice	28714.01	-8834.33	15301.51	1566215.95	904413.33	217.64

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 225 deg - No Ice	28714.01	-12493.63	12493.63	1278835.15	1278935.39	112.65
Dead+Wind 240 deg - No Ice	28714.01	-15301.51	8834.33	904313.13	1566316.26	-0.01
Dead+Wind 270 deg - No Ice	28714.01	-17668.67	0.00	136.94	1808584.84	-217.63
Dead+Wind 300 deg - No Ice	28714.01	-15301.51	-8834.33	-904039.10	1566315.99	-376.94
Dead+Wind 315 deg - No Ice	28714.01	-12493.63	-12493.63	-1278560.96	1278935.07	-420.43
Dead+Wind 330 deg - No Ice	28714.01	-8834.33	-15301.51	-1565941.60	904413.05	-435.27
Dead+Ice+Temp	33606.42	0.00	0.00	155.72	269.72	0.00
Dead+Wind 0 deg+Ice+Temp	33606.42	-0.00	-14542.41	-1532659.90	278.94	-346.63
Dead+Wind 30 deg+Ice+Temp	33606.42	7271.20	-12594.09	-1327300.64	-766131.44	-200.12
Dead+Wind 45 deg+Ice+Temp	33606.42	10283.03	-10283.03	-1083706.85	-1083588.95	-103.59
Dead+Wind 60 deg+Ice+Temp	33606.42	12594.09	-7271.20	-766249.29	-1327182.67	-0.01
Dead+Wind 90 deg+Ice+Temp	33606.42	14542.41	0.00	161.05	-1532541.77	200.13
Dead+Wind 120 deg+Ice+Temp	33606.42	12594.09	7271.20	766571.55	-1327182.95	346.64
Dead+Wind 135 deg+Ice+Temp	33606.42	10283.03	10283.03	1084029.27	-1083589.28	386.62
Dead+Wind 150 deg+Ice+Temp	33606.42	7271.20	12594.09	1327623.22	-766131.72	400.25
Dead+Wind 180 deg+Ice+Temp	33606.42	-0.00	14542.41	1532982.65	278.94	346.63
Dead+Wind 210 deg+Ice+Temp	33606.42	-7271.20	12594.09	1327623.71	766689.89	200.14
Dead+Wind 225 deg+Ice+Temp	33606.42	-10283.03	10283.03	1084029.83	1084147.73	103.59
Dead+Wind 240 deg+Ice+Temp	33606.42	-12594.09	7271.20	766572.04	1327741.69	-0.01
Dead+Wind 270 deg+Ice+Temp	33606.42	-14542.41	0.00	161.05	1533100.78	-200.13
Dead+Wind 300 deg+Ice+Temp	33606.42	-12594.09	-7271.20	-766249.78	1327741.40	-346.62
Dead+Wind 315 deg+Ice+Temp	33606.42	-10283.03	-10283.03	-1083707.41	1084147.40	-386.62
Dead+Wind 330 deg+Ice+Temp	33606.42	-7271.20	-12594.09	-1327301.13	766689.60	-400.27
Dead+Wind 0 deg - Service	28714.01	-0.00	-6901.82	-706747.77	237.96	-147.52
Dead+Wind 30 deg - Service	28714.01	3450.91	-5977.15	-612043.09	-353204.62	-85.16
Dead+Wind 45 deg - Service	28714.01	4880.32	-4880.32	-499707.35	-499606.78	-44.09
Dead+Wind 60 deg - Service	28714.01	5977.15	-3450.91	-353305.18	-611942.51	-0.00
Dead+Wind 90 deg - Service	28714.01	6901.82	0.00	137.39	-706647.16	85.17
Dead+Wind 120 deg - Service	28714.01	5977.15	3450.91	353579.98	-611942.55	147.52
Dead+Wind 135 deg - Service	28714.01	4880.32	4880.32	499982.17	-499606.83	164.53
Dead+Wind 150 deg - Service	28714.01	3450.91	5977.15	612317.94	-353204.66	170.33
Dead+Wind 180 deg - Service	28714.01	-0.00	6901.82	707022.63	237.96	147.52
Dead+Wind 210 deg - Service	28714.01	-3450.91	5977.15	612318.01	353680.62	85.17
Dead+Wind 225 deg - Service	28714.01	-4880.32	4880.32	499982.25	500082.83	44.09
Dead+Wind 240 deg - Service	28714.01	-5977.15	3450.91	353580.05	612418.59	-0.00
Dead+Wind 270 deg - Service	28714.01	-6901.82	0.00	137.39	707123.24	-85.17
Dead+Wind 300 deg - Service	28714.01	-5977.15	-3450.91	-353305.26	612418.55	-147.51
Dead+Wind 315 deg - Service	28714.01	-4880.32	-4880.32	-499707.43	500082.78	-164.53
Dead+Wind 330 deg - Service	28714.01	-3450.91	-5977.15	-612043.17	353680.57	-170.34

Solution Summary

Load Comb.	Sum of Applied Forces PX	PY	PZ	Sum of Reactions PX	PY	PZ	% Error
	lb	lb	lb	lb	lb	lb	
1	0.00	-28714.01	0.00	0.00	28714.01	0.00	0.000%
2	0.00	-28714.01	-17668.66	0.00	28714.01	17668.67	0.000%
3	8834.33	-28714.01	-15301.51	-8834.33	28714.01	15301.51	0.000%
4	12493.63	-28714.01	-12493.63	-12493.63	28714.01	12493.63	0.000%
5	15301.51	-28714.01	-8834.33	-15301.51	28714.01	8834.33	0.000%
6	17668.66	-28714.01	0.00	-17668.67	28714.01	-0.00	0.000%
7	15301.51	-28714.01	8834.33	-15301.51	28714.01	-8834.33	0.000%
8	12493.63	-28714.01	12493.63	-12493.63	28714.01	-12493.63	0.000%
9	8834.33	-28714.01	15301.51	-8834.33	28714.01	-15301.51	0.000%
10	0.00	-28714.01	17668.66	0.00	28714.01	-17668.67	0.000%
11	-8834.33	-28714.01	15301.51	8834.33	28714.01	-15301.51	0.000%
12	-12493.63	-28714.01	12493.63	12493.63	28714.01	-12493.63	0.000%
13	-15301.51	-28714.01	8834.33	15301.51	28714.01	-8834.33	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
14	-17668.66	-28714.01	0.00	17668.67	28714.01	-0.00	0.000%
15	-15301.51	-28714.01	-8834.33	15301.51	28714.01	8834.33	0.000%
16	-12493.63	-28714.01	-12493.63	12493.63	28714.01	12493.63	0.000%
17	-8834.33	-28714.01	-15301.51	8834.33	28714.01	15301.51	0.000%
18	0.00	-33606.42	0.00	0.00	33606.42	0.00	0.000%
19	0.00	-33606.42	-14542.40	0.00	33606.42	14542.41	0.000%
20	7271.20	-33606.42	-12594.08	-7271.20	33606.42	12594.09	0.000%
21	10283.03	-33606.42	-10283.03	-10283.03	33606.42	10283.03	0.000%
22	12594.08	-33606.42	-7271.20	-12594.09	33606.42	7271.20	0.000%
23	14542.40	-33606.42	0.00	-14542.41	33606.42	-0.00	0.000%
24	12594.08	-33606.42	7271.20	-12594.09	33606.42	-7271.20	0.000%
25	10283.03	-33606.42	10283.03	-10283.03	33606.42	-10283.03	0.000%
26	7271.20	-33606.42	12594.08	-7271.20	33606.42	-12594.09	0.000%
27	0.00	-33606.42	14542.40	0.00	33606.42	-14542.41	0.000%
28	-7271.20	-33606.42	12594.08	7271.20	33606.42	-12594.09	0.000%
29	-10283.03	-33606.42	10283.03	10283.03	33606.42	-10283.03	0.000%
30	-12594.08	-33606.42	7271.20	12594.09	33606.42	-7271.20	0.000%
31	-14542.40	-33606.42	0.00	14542.41	33606.42	-0.00	0.000%
32	-12594.08	-33606.42	-7271.20	12594.09	33606.42	7271.20	0.000%
33	-10283.03	-33606.42	-10283.03	10283.03	33606.42	10283.03	0.000%
34	-7271.20	-33606.42	-12594.08	7271.20	33606.42	12594.09	0.000%
35	0.00	-28714.01	-6901.82	0.00	28714.01	6901.82	0.000%
36	3450.91	-28714.01	-5977.15	-3450.91	28714.01	5977.15	0.000%
37	4880.32	-28714.01	-4880.32	-4880.32	28714.01	4880.32	0.000%
38	5977.15	-28714.01	-3450.91	-5977.15	28714.01	3450.91	0.000%
39	6901.82	-28714.01	0.00	-6901.82	28714.01	-0.00	0.000%
40	5977.15	-28714.01	3450.91	-5977.15	28714.01	-3450.91	0.000%
41	4880.32	-28714.01	4880.32	-4880.32	28714.01	-4880.32	0.000%
42	3450.91	-28714.01	5977.15	-3450.91	28714.01	-5977.15	0.000%
43	0.00	-28714.01	6901.82	0.00	28714.01	-6901.82	0.000%
44	-3450.91	-28714.01	5977.15	3450.91	28714.01	-5977.15	0.000%
45	-4880.32	-28714.01	4880.32	4880.32	28714.01	-4880.32	0.000%
46	-5977.15	-28714.01	3450.91	5977.15	28714.01	-3450.91	0.000%
47	-6901.82	-28714.01	0.00	6901.82	28714.01	-0.00	0.000%
48	-5977.15	-28714.01	-3450.91	5977.15	28714.01	3450.91	0.000%
49	-4880.32	-28714.01	-4880.32	4880.32	28714.01	4880.32	0.000%
50	-3450.91	-28714.01	-5977.15	3450.91	28714.01	5977.15	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00020308
3	Yes	5	0.00000001	0.00045965
4	Yes	5	0.00000001	0.00052006
5	Yes	5	0.00000001	0.00046074
6	Yes	4	0.00000001	0.00018667
7	Yes	5	0.00000001	0.00046274
8	Yes	5	0.00000001	0.00052019
9	Yes	5	0.00000001	0.00045867
10	Yes	4	0.00000001	0.00020311
11	Yes	5	0.00000001	0.00046209
12	Yes	5	0.00000001	0.00052034
13	Yes	5	0.00000001	0.00046100
14	Yes	4	0.00000001	0.00018672

15	Yes	5	0.00000001	0.00045902
16	Yes	5	0.00000001	0.00052026
17	Yes	5	0.00000001	0.00046311
18	Yes	4	0.00000001	0.00000001
19	Yes	5	0.00000001	0.00022220
20	Yes	5	0.00000001	0.00069304
21	Yes	5	0.00000001	0.00078524
22	Yes	5	0.00000001	0.00069413
23	Yes	5	0.00000001	0.00022214
24	Yes	5	0.00000001	0.00069622
25	Yes	5	0.00000001	0.00078545
26	Yes	5	0.00000001	0.00069213
27	Yes	5	0.00000001	0.00022224
28	Yes	5	0.00000001	0.00069570
29	Yes	5	0.00000001	0.00078575
30	Yes	5	0.00000001	0.00069459
31	Yes	5	0.00000001	0.00022220
32	Yes	5	0.00000001	0.00069254
33	Yes	5	0.00000001	0.00078559
34	Yes	5	0.00000001	0.00069665
35	Yes	4	0.00000001	0.00006556
36	Yes	4	0.00000001	0.00088573
37	Yes	5	0.00000001	0.00004657
38	Yes	4	0.00000001	0.00089020
39	Yes	4	0.00000001	0.00006367
40	Yes	4	0.00000001	0.00089868
41	Yes	5	0.00000001	0.00004661
42	Yes	4	0.00000001	0.00088188
43	Yes	4	0.00000001	0.00006559
44	Yes	4	0.00000001	0.00089614
45	Yes	5	0.00000001	0.00004664
46	Yes	4	0.00000001	0.00089157
47	Yes	4	0.00000001	0.00006371
48	Yes	4	0.00000001	0.00088340
49	Yes	5	0.00000001	0.00004663
50	Yes	4	0.00000001	0.00090031

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147.5 - 108.5	28.529	47	1.6149	0.0003
L2	112.25 - 72.25	16.955	46	1.4597	0.0003
L3	76.75 - 35.75	7.716	46	0.9717	0.0003
L4	41 - 0	2.165	46	0.4821	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	(2) Decibel DB980H90	47	28.359	1.6138	0.0003	39986
137.00	DB948F85T2E-M	47	24.963	1.5904	0.0003	19041
127.00	(4) DB844H90	47	21.629	1.5554	0.0003	9752
117.00	(3) 7184.14	47	18.419	1.4980	0.0003	6554

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
50.00	GPS	46	3.178	0.5691	0.0002	3710

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	147.5 - 108.5	72.903	14	4.1278	0.0007
L2	112.25 - 72.25	43.336	14	3.7313	0.0007
L3	76.75 - 35.75	19.727	14	2.4843	0.0007
L4	41 - 0	5.536	14	1.2327	0.0005

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
147.00	(2) Decibel DB980H90	14	72.467	4.1253	0.0007	15786
137.00	DB948F85T2E-M	14	63.792	4.0681	0.0007	7516
127.00	(4) DB844H90	14	55.277	3.9801	0.0007	3848
117.00	(3) 7184.14	14	47.077	3.8315	0.0007	2585
50.00	GPS	14	8.125	1.4984	0.0005	1453

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	lb	lb	
L1	147.5 - 108.5 (1)	TP29.41x22x0.25	39.00	147.50	175.3	4.861	22.5731	-8035.82	109734.00	0.073
L2	108.5 - 72.25 (2)	TP35.798x28.1975x0.25	40.00	147.50	143.7	7.230	27.5289	-12626.60	199036.00	0.063
L3	72.25 - 35.75 (3)	TP42.232x34.4429x0.3125	41.00	147.50	121.8	10.060	40.5896	-19140.00	408313.00	0.047
L4	35.75 - 0 (4)	TP48.4x40.6096x0.375	41.00	147.50	103.8	13.855	57.1618	-28705.00	791957.00	0.036

Pole Bending Design Data

Section No.	Elevation	Size	Actual M_x	Actual f_{bx}	Allow. F_{bx}	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y	Actual f_{by}	Allow. F_{by}	Ratio $\frac{f_{by}}{F_{by}}$
	ft		lb-ft	ksi	ksi		lb-ft	ksi	ksi	
L1	147.5 - 108.5 (1)	TP29.41x22x0.25	207575.00	-15.734	36.000	0.437	0.00	0.000	36.000	0.000

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L2	108.5 - 72.25 (2)	TP35.798x28.1975x0.25	626463.33	-31.878	39.000	0.817	0.00	0.000	39.000	0.000
L3	72.25 - 35.75 (3)	TP42.232x34.4429x0.3125	1131525.00	-33.121	39.000	0.849	0.00	0.000	39.000	0.000
L4	35.75 - 0 (4)	TP48.4x40.6096x0.375	1808625.00	-32.038	39.000	0.821	0.00	0.000	39.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	147.5 - 108.5 (1)	TP29.41x22x0.25	0.073	0.437	0.000	0.510 ✓	1.333	H1-3 ✓
L2	108.5 - 72.25 (2)	TP35.798x28.1975x0.25	0.063	0.817	0.000	0.881 ✓	1.333	H1-3 ✓
L3	72.25 - 35.75 (3)	TP42.232x34.4429x0.3125	0.047	0.849	0.000	0.896 ✓	1.333	H1-3 ✓
L4	35.75 - 0 (4)	TP48.4x40.6096x0.375	0.036	0.821	0.000	0.858 ✓	1.333	H1-3 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	147.5 - 108.5	Pole	TP29.41x22x0.25	1	-8035.82	146275.42	38.3	Pass
L2	108.5 - 72.25	Pole	TP35.798x28.1975x0.25	2	-12626.60	265314.98	66.1	Pass
L3	72.25 - 35.75	Pole	TP42.232x34.4429x0.3125	3	-19140.00	544281.21	67.2	Pass
L4	35.75 - 0	Pole	TP48.4x40.6096x0.375	4	-28705.00	1055678.64	64.3	Pass
							Summary	
						Pole (L3)	67.2	Pass
						RATING =	**67.2**	**Pass**

ANCHOR BOLT AND BASE PLATE ANALYSIS

ANCHOR BOLT AND BASEPLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment:	$OM := 1809 \cdot kips \cdot ft$	*user input*
Shear Force:	$Shear := 18 \cdot kips$	*user input*
Axial Force:	$Axial := 34 \cdot kips$	*user input*

Anchor Bolt Data:

Use ASTM 615 Grade 75

Number of Anchor Bolts = N	$N := 12$	*user input*
Bolt Ultimate Strength:	$F_u := 100 \cdot ksi$	*user input*
Bolt Allowable Strength:	$Fy := 75 \cdot ksi$	*user input*
Diameter Of Anchor Bolts	$D := 2.25in$	*user input*
Threaded length per inch	$n := 4.5$	*user input*
Bolt "Column" Distance:	$l := 3in$	*user input*
Bolt Modulus:	$E := 29000 \cdot ksi$	*user input*

Base Plate Data:

Plate Yield Strength:	$Fy_{bp} := 50 \cdot ksi$	*user input*
Base Plate Thickness:	$PlateThicknessProvide := 3 \cdot in$	*user input*

Geometric Layout Data:

Distance from the center of gravity of the group to bolt in question = d(i)

Distances for loading condition (see detail):

$d_1 := 27.5001 \cdot in$ *user input*

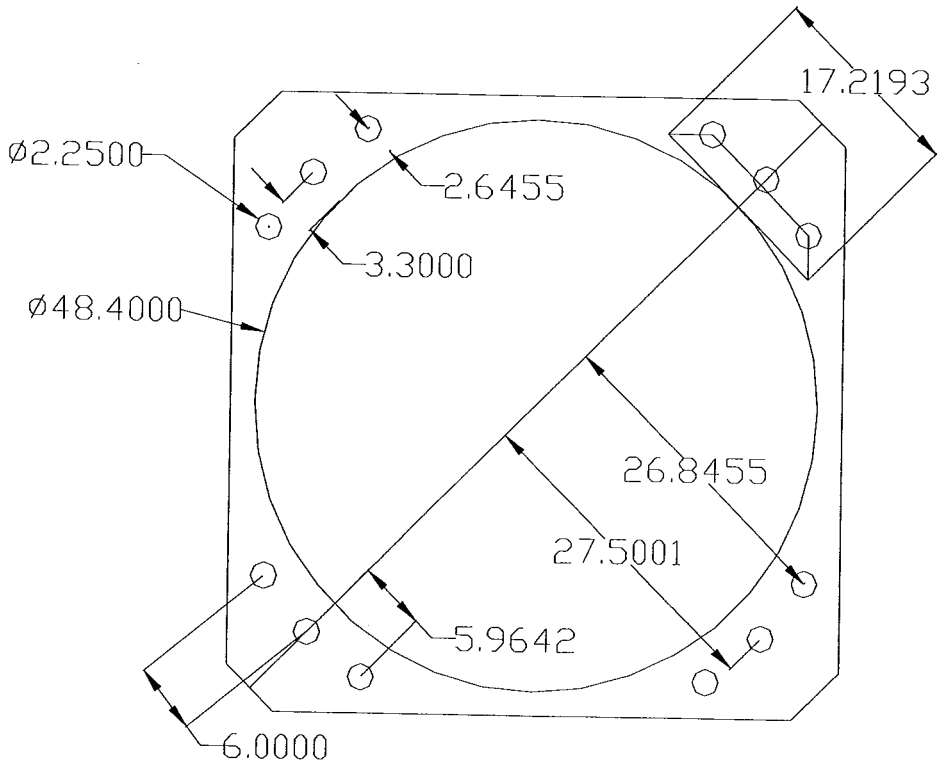
$d_2 := 26.8455 \cdot in$ *user input*

$d_3 := 5.9642 \cdot in$ *user input*

$MomentArm_1 := 3.3000 \cdot in$ *user input*

$MomentArm_2 := 2.6455 \cdot in$ *user input*

$EffectiveWidth := 17.2193 \cdot in$ *user input*



DETAIL - ANCHOR BOLT AND PLATE

Anchor Bolt Section Properties:

Polar Moment of Inertia (J) divided by Area (A) = Σd

$$\Sigma d := (d_1)^2 \cdot 2 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 4 \qquad \Sigma d = 4.54 \times 10^3\ in^2$$

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 3.98\ in^2$$

Net Area of Bolt:

$$A_{net} := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 \qquad A_{net} = 3.25\ in^2$$

Net Diameter:

$$D_n := \frac{2 \cdot \sqrt{A_{net}}}{\sqrt{\pi}} \qquad D_n = 2.03\ in$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4} \qquad r = 0.51\ in$$

Section Modulus of Bolt:

$$S_x := \frac{\pi \cdot D_n^{\ 3}}{32} \qquad S_x = 0.83\ in^3$$

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{Shear}{N} \right) \cdot 1 \qquad M_x = 0.38\ kips \cdot ft$$

$$f_{bx} := \frac{M_x}{S_x} \qquad f_{bx} = 5.45\ ksi$$

Allowable Bending

$$F_{bx} := 1.33 \cdot 0.60 \cdot Fy \qquad F_{bx} = 59.85\ ksi$$

Note: 1.33 increase allowed per TIA/EIA

Anchor Bolt Tensile Stress Check:

Maximum Tensile Force (Gross Area):

$AllowableTension := 1.33 \cdot (0.33 \cdot A_g \cdot F_u)$ $AllowableTension = 174.51\ kips$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$F_{net.area} := 1.33 \cdot (0.60 \cdot A_{net} \cdot Fy)$ $F_{net.area} = 194.37\ kips$

Note: 1.33 increase allowed per TIA/EIA

Maximum Applied Tension:

$$MaxTension := \frac{OM \cdot d_l}{\Sigma d} - \frac{Axial}{N}$$ $MaxTension = 128.73\ kips$

Check Stresses:

Note: Bolts supplied are "upset bolts." Use net area for checking per AISC.

$AnchorBoltStress := if(F_{net.area} > MaxTension, "Not\ Overstressed", "Overstressed")$

$AnchorBoltStress = "Not\ Overstressed"$

$$PercentStressed := 100 \cdot \frac{MaxTension}{F_{net.area}}$$

$PercentStressed = 66.23$

Note: Shear Stress is negligible

Check Compression & Combined Stresses (if required):

Check to see if a complete combined stress analysis is required:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required."

Set the clear space between the plate and bolt to zero if a combined stress analysis is not required and set the bending stress to zero:

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0.0\,\text{in} & \text{otherwise} \end{cases} \qquad l = 0 \qquad f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0.0\,\text{ksi} & \text{otherwise} \end{cases} \qquad f_{bx} = 0\,\text{ksi}$$

Allowable Compressive Force:

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Fy}} \qquad C_c = 87.36$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^2}\right] \cdot Fy}{\frac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^3}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} \qquad F_a = 45\,\text{ksi}$$

$F_a := 1.33 \cdot F_a$ Note: 1.33 increase allowed per TIA/EIA $\qquad F_a = 59.85\,\text{ksi}$

Applied Compressive Force:

$$\text{MaxCompression} := \frac{OM \cdot d_1}{\Sigma d} + \frac{\text{Axial}}{N} \qquad \text{MaxCompression} = 134.4\,\text{kips}$$

$$f_a := \frac{\text{MaxCompression}}{A_{net}} \qquad f_a = 41.38\,\text{ksi}$$

Check Combined Stresses:

$$\text{StressRatio} := \frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \qquad \text{StressRatio} = 0.69$$

Condition := if(StressRatio ≤ 1.0, "Not Overstressed", "Overstressed")

Condition = "Not Overstressed"

Base Plate Analysis:

Force From Bolt(s):

$$C_1 := \frac{OM \cdot d_1}{\Sigma d} + \frac{Axial}{N} \qquad C_1 = 134.4\,kips$$

$$C_2 := \frac{OM \cdot d_2}{\Sigma d} + \frac{Axial}{N} \qquad C_2 = 131.27\,kips$$

Bending Stress In Plate:

$$f_{bp} := \frac{6 \cdot \left(1 \cdot C_1 \cdot MomentArm_1 + 2 \cdot C_2 \cdot MomentArm_2\right)}{EffectiveWidth \cdot PlateThicknessProvide^2} \qquad f_{bp} = 44.06\,ksi$$

Check Stresses:

$$BasePlateRatio := \frac{f_{bp}}{1.33 \cdot 0.75 Fy_{bp}} \qquad BasePlateRatio = 0.88$$

BasePlateStress := if(BasePlateRatio < 1, "Not Over Stress", "Is Over Stress")

BasePlateStress = "Not Over Stress"

FOUNDATION ANALYSIS

URS

Job	147' Monopole - Enfield, CT	Project No.	VZ1-202	Page	of
Description	Spread Footing w/ Pier Analysis	Computed by	JEK	Sheet	1 of 9
		Checked by		Date	08/01/06

MONOPOLE FOUNDATION ANALYSIS

TOWER FORCES:

Moment Caused by Tower	$M_t := 1809 \cdot ft \cdot kips$
Shear at Base of Tower	$S_t := 18kip$
Max Compressive Force	$C_t := 34 \cdot kip$
Height of Tower	$H_t := 147.5 \cdot ft$
Base Plate Bolt Circle	$MP := 4.58ft$

FOOTING DIMENSIONS:

Overall Depth of Footing	$D_f := 10ft$
Length of Pier	$L_p := 7.5 \cdot ft$
Extension of Pier Above Grade	$L_{pag} := .5 \cdot ft$
Diameter of Pier	$d_p := 7 \cdot ft$
Thickness of Footing	$T_f := 3 \cdot ft$
Width of Footing:	$W_f := 23.5ft$
Length of Anchor Bolts:	$L_{st} := 96in$
Projection of anchor bolts above pier	$A_{BP} := 12 \cdot in$
Anchor bolts area	$A_{anchor} := 3.97 \cdot in^2$

PROPERTIES:

Compressive Strength of Concrete	$fc := 3000psi$
Yield Strength of Steel Reinforcement	$fy := 60000 \cdot psi$
Yield Strength of Anchor Bolt	$fya := 75000 \cdot psi$
Internal Friction Angle of Soil	$\phi_s := 30 \cdot deg$
Allowable Bearing Capacity	$q_s := 3000 \cdot psf$
Unit Weight of Soil	$\gamma_s := 115 \cdot pcf$
Unit Weight of Concrete	$\gamma_c := 150 \cdot pcf$
Depth to Neglect	$n := 0ft$
Cohesion of Clay Type Soil Note: Use 0 for Sandy Soil	$c := 0 \cdot ksf$
Seismic Zone Factor: UBC Fig 23-2	$Z := 2$
Coefficient of Friction between soil and Concrete:	$\mu := 0.45$
Clear Cover of Reinforcement Pier:	$Cvr_{pier} := 3 \cdot in$
Clear Cover of Reinforcement Pier:	$Cvr_{pad} := 3 \cdot in$
Anchor Bolt Diameter	$d_{anchor} := 2.25in$

PIER REINFORCEMENT:

Bar Size	$BSpier := 11$	Bar Diameter	$d_{bpier} := 1.41 \cdot in$
Number of Bars	$NBpier := 24$	Bar Area	$A_{bpier} := 1.56 \cdot in^2$

PAD REINFORCEMENT:

TOP:	Bar Size	$BS_{top} := 9$	Bar Diameter	$d_{btop} := 1.128 \cdot in$
	Number of Bars	$NB_{top} := 25$	Bar Area	$A_{btop} := 1 \cdot in^2$
BOTTOM:	Bar Size	$BS_{bot} := 9$	Bar Diameter	$d_{bbot} := 1.128 \cdot in$
	Number of Bars	$NB_{bot} := 25$	Bar Area	$A_{bot} := 1 \cdot in^2$

Coefficient of Lateral Soil Pressure: $K_p := \dfrac{1 + \sin(\phi_s)}{1 - \sin(\phi_s)}$ $K_p = 3$

Load Factor (EIA 3.1.1): $LF := if\left[H_t \le 700 \cdot ft, 1.3, if\left[H_t \ge 1200, 1.7, 1.3 + \left(\dfrac{H_t - 700}{1200 - 700}\right) \cdot 0.4\right]\right]$ $LF = 1.3$

URS

Job	147' Monopole - Enfield, CT	Project No.	VZ1-202	Page	of
Description	Spread Footing w/ Pier Analysis	Computed by	JEK	Sheet 2	of 9
		Checked by		Date	08/01/06

CHECK ANCHOR STEEL EMBEDMENT

Depth:

$D_{ab} := L_{st} - A_{BP}$ $D_{ab} = 7\,ft$

$L_{anchor} := \frac{(0.11 \cdot fy) \cdot in}{\sqrt{f'c \cdot psi}}$ $L_{anchor} = 10.0416\,ft$

$DepthCheck := if(D_{ab} \geq L_{anchor}, "Okay", "No Good")$

$DepthCheck = "No Good"$ **Note:** anchor plate is provided

STABILITY OF FOOTING

Passive Pressure:

$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p}$ $P_{pn} = 0\,ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p}$ $P_{pt} = 2.415\,ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}]$ $P_{top} = 2.415\,ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p}$ $P_{bot} = 3.45\,ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2}$ $P_{ave} = 2.9325\,ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)]$ $T_p = 3\,ft$

$A_p := W_f \cdot T_p$ $A_p = 70.5\,ft^2$

Ultimate Shear:

$S_u := P_{ave} \cdot A_p$ $S_u = 206.7412\,kip$

Weight of Concrete Pad:

$WT_c := \left[\left(W_f^2 \cdot T_f\right) + d_p^2 L_p\right] \cdot \gamma_c$ $WT_c = 303.6375\,kip$

Weight of Soil: above Footing:

$WT_{s1} := \left[W_f^2 \cdot \left(\left|L_p - L_{pag}\right|\right) - \frac{d_p^2 \cdot \pi}{4} \cdot \left(\left|L_p - L_{pag}\right|\right)\right] \cdot \gamma_s$ $WT_{s1} = 413.5812\,kip$

Weight of Soil Wedge at back face:

$WT_{s2} := \left(\frac{D_f^2 \cdot \tan(\phi_s)}{2} \cdot W_f\right) \cdot \gamma_s$ $WT_{s2} = 78.0145\,kip$

Total Weight:

$WT_{tot} := WT_c + WT_{s1} + C_t$ $WT_{tot} = 751.2187\,kip$

Resisting Moment:

$M_r := (WT_{tot}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \cdot \left(W_f + \frac{D_f \tan(\phi_s)}{3}\right)$ $M_r = 11017.0398\,kip \cdot ft$

Overturning Moment:

$M_{ot} := M_t + S_t \cdot (L_p + T_f)$ $M_{ot} = 1998\,kip \cdot ft$

Factor of Safety:

$FS := \frac{M_r}{M_{ot}}$ $FS_{req} := 2$ $FS = 5.51$

$SafetyCheck := if(FS > FS_{req}, "Okay", "No Good")$ $SafetyCheck = "Okay"$

URS

Job	147' Monopole - Enfield, CT	Project No.	VZ1-202	Page	of
Description	Spread Footing w/ Pier Analysis	Computed by	JEK	Sheet 3	of 9
		Checked by		Date 08/01/06	Date

SHEAR CAPACITY IN PIER

$FS := 2$

$$S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS}$$

$S_p = 272.3948\ \text{kips}$

$\text{ShearCheck} := \text{if}(S_p > S_t, \text{"Okay"}, \text{"No Good"})$

ShearCheck = "Okay"

BEARING PRESSURE CAUSED BY FOOTING

$$A_{mat} := W_f^2$$

$A_{mat} = 552.25\ \text{ft}^2$

$$S := \frac{W_f^3}{6}$$

$S = 2162.9792\ \text{ft}^3$

$$P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S}$$

$P_{max} = 2.284\ \text{ksf}$

$$P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S}$$

$P_{min} = 0.4366\ \text{ksf}$

$\text{MaxPressure} := \text{if}(P_{max} < q_s, \text{"Okay"}, \text{"No Good"})$

MaxPressure = "Okay"

$\text{MinPressure} := \text{if}[(P_{min} \geq 0) \cdot (P_{min} < q_s), \text{"Okay"}, \text{"No Good"}]$

MinPressure = "Okay"

Distance to Resultant of Pressure Distribution:

$$X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3}$$

$X_p = 9.6844\ \text{ft}$

Distance to Kern:

$$X_k := \frac{W_f}{6}$$

$X_k = 3.9167\ \text{ft}$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity:

$$e := \frac{M_{ot}}{WT_{tot}}$$

$e = 2.6597$

Adjusted Soil Pressure:

$$P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \left(\frac{W_f}{2} - e \right)}$$

$P_a = 2.3444\ \text{ksf}$

$$q_{adj} := \text{if}\left(P_{min} < 0, P_a, \frac{P_{max}}{\text{ft}^2} \right)$$

$q_{adj} = 2.284\ \text{ksf}$

$\text{PressureCheck} := \text{if}(q_{adj} < q_s, \text{"Okay"}, \text{"No Good"})$

PressureCheck = "Okay"

CONCRETE BEARING CAPACITY (ACI 10.17)

$\phi_c := 0.75$ (ACI 9.3.2.2)

$P_b := \phi_c \cdot 0.85 \cdot f'c \cdot \frac{d_p^2 \cdot \pi}{4}$ $P_b = 10598.6341\,kip$

BearingCheck := if($P_b > LF \cdot C_t$, "Okay", "No Good") BearingCheck = "Okay"

SHEAR STRENGTH OF CONCRETE

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_{av} := .85$ (ACI 9.3.2.3)

$d := T_f - Cvr_{pad} - d_{bbot}$ $d = 31.872\,in$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$ $d_1 = 8.25\,ft$

$d_2 := d_1 - d$ $d_2 = 5.594\,ft$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$ $L = 27.271\,ft$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$ $Slope = 0.0786\,kcf$

$V_{req} := LF \cdot \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$ $V_{req} = 493.9246\,kip$

ACI 11.3.1.1 $V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f'c \cdot psi} \cdot W_f \cdot d$ $V_{Avail} = 836.8892\,kip$

BeamShearCheck := if($V_{req} < V_{Avail}$, "Okay", "No Good") BeamShearCheck = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.12.2.1)

$b_o := (d_p + d) \cdot \pi$ $b_o = 30.3352\,ft$

Area included inside bo: $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4}$ $A_{bo} = 73.2292\,ft^2$

Area outside of bo: $A_{out} := A_{mat} - A_{bo}$ $A_{out} = 479.0208\,ft^2$

Guess Value: $v_u := 1\,ksf$ (From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := \text{Find}(v_u)$ $v_u = 9.3238\,ksf$

$V_u := v_u \cdot d \cdot W_f$ $V_u = 581.9567\,kips$

$V_{req} := LF \cdot V_u$ $V_{req} = 756.5437\,kips$

$V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f'c \cdot psi} \cdot b_o \cdot d$ $V_{Avail} = 2160.6143\,kips$

$PunchingShearCheck := \text{if}(V_{req} < V_{Avail}, \text{"Okay"}, \text{"No Good"})$ PunchingShearCheck = "Okay"

STEEL REINFORCEMENT IN THE PAD $\phi_m := .90$ ACI 9.3.2.2

Take Maximum Bending at face of Pier:

$q_b := q_{adj} - d_1 \cdot Slope$ $q_b = 1.6354\,ksf$

$M_n := \frac{LF}{\phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f$ $M_n = 2388.69\,kip \cdot ft$

ACI 10.2.7.3 $\beta := \text{if}\left[f'c \le 4000 \cdot psi, .85, \text{if}\left[f'c \ge 8000 \cdot psi, .65, .85 - \left(\frac{\frac{f'c}{psi} - 4000}{1000} \right) \cdot .05 \right] \right]$ $\beta = 0.85$

$R_u := \frac{M_n}{\phi_m \cdot W_f \cdot d^2}$ $R_u = 16010.1\,lbf$

$\rho := \frac{0.85 \cdot f'c}{fy} \left(1 - \sqrt{1 - \frac{2 \cdot R_u}{0.85 \cdot f'c}} \right)$ $\rho = 0.0019$

$\rho_{min} := 1.333 \cdot \rho$ $\rho_{min} = 0.00253$

Temperature and Shrinkage: $\rho_{sh} := if(fy \geq 60000 \cdot psi, 0.0018, 0.0020)$ $\rho_{sh} = 0.0018$

(ACI 7.12.2.1b)

FOR BOTTOM BARS: $As := \max(\rho, \rho_{min}, \rho_{sh}) \cdot W_f \cdot d$ $As = 22.7071\ in^2$

$As_{prov} := A_{bot} \cdot NB_{bot}$ $As_{prov} = 25\ in^2$

$PadReinforcement := if(As_{prov} > As, "Okay", "No Good")$ $PadReinforcement = "Okay"$

FOR TOP BARS: $As := \rho_{sh} \cdot (W_f \cdot d)$ $As = 16.1782\ in^2$

$As_{prov} := A_{btop} \cdot NB_{top}$ $As_{prov} = 25\ in^2$

$PadReinforcement := if(As_{prov} > As, "Okay", "No Good")$ $PadReinforcement = "Okay"$

TENSION (ACI 12.2.3) **DEVELOPMENT LENGTH OF PAD REINFORCEMENT**

Bar Spacing: $B_{sPad} := \dfrac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1}$ $B_{sPad} = 10.325\ in$

Development Length Factors:

Reinforcement Location Factor	$\alpha := 1.0$	
Coating Factor	$\beta := 1.0$	
Concrete strength Factor	$\lambda := 1.0$	
Reinforcement Size Factor	$\gamma := 1.0$	

Spacing or Cover Dimension: $c := if\left(Cvr_{pad} < \dfrac{B_{sPad}}{2}, Cvr_{pad}, \dfrac{B_{sPad}}{2}\right)$ $c = 3\ in$

Transverse Reinforcement Index As allowed by ACI 12.2.4 $k_{tr} := 0$

$$L_{dbt} := \frac{3}{40} \cdot \frac{fy}{\sqrt{f'c \cdot psi}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{\frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot}$$

$L_{dbt} = 34.8457\ in$

$L_{dbmin} := 12 \cdot in$

Minimum Development Length: (ACI 12.2.1) $L_{dbtCheck} := if(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin")$ $L_{dbtCheck} = "Use\ L.dbt"$

Available Length in Pad: $L_{Pad} := \dfrac{W_f}{2} - \dfrac{d_p}{2} - Cvr_{pad}$ $L_{Pad} = 96\ in$

$LpadTension := if(L_{Pad} > L_{dbt}, "Okay", "No Good")$ $LpadTension = "Okay"$

REINFORCEMENT IN PIER

Pier Area: $A_{pp} := \frac{\pi \cdot d_p^2}{4}$ $A_p = 5541.7694\ in^2$

(ACI 10.8.4 and 10.9.1) $A_{smin} := 0.01 \cdot 0.05 \cdot A_p$ $A_{smin} = 2.7709\ in^2$

$A_{sprov} := NBpier \cdot A_{bpier}$ $A_{sprov} = 37.44\ in^2$

$SteelAreaCheck := if(A_{sprov} > A_{smin}, "Okay", "No Good")$ $SteelAreaCheck = "Okay"$

NOTE: Anchor Bolts are not accounted for in reinforcement calculation and will provide additional reinforcement to satisfy minimum requirement of steel.

Bar Spacing In Pier: $B_{sPier} := \frac{d_p \cdot \pi}{NBpier} - d_{bpier}$. $B_{sPier} = 9.5856\ in$

Diamter of Reinforcement Cage: $Diam_{cage} := d_p - 2 \cdot Cvr_{pier}$ $Diam_{cage} = 78\ in$

Maximum Moment in Pier: $M_p := \left[M_t + S_t \cdot \left(L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF$ $M_p = 30466.8\ in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

(defined variables) $(f_c\ \ f_y\ \ cl\ \ Spiral) = (3\ \ 60\ \ 3\ \ 0)$

The required input is column diameter in inches, number of reinforcing bars, bar size number, factored axial load in kips and moment in kip inches: $(D\ \ N\ \ n\ \ P_u\ \ M_{xu}) := (84\ \ 30\ \ 8\ \ 34\ \ 30467)$

Clears any previous output: $(\phi P_n\ \ \phi M_{xn}\ \ f_{sp}\ \ \rho) := (0\ \ 0\ \ 0\ \ 0)$

$(\phi P_n\ \ \phi M_{xn}\ \ f_{sp}\ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$

The Output is given as useable axial load in kips, moment capacity in kip inches, splicing stress in ksi, and reinforcement ratio: $(\phi P_n\ \ \phi M_{xn}\ \ f_{sp}\ \ \rho) = (52.9871\ \ 47481.1342\ \ -60\ \ 0.0043)$

Column size and reinforcement may be changed to match capacity to the applied load.

$AxialLoadCheck := if(\phi P_n \geq P_u, "Okay", "No Good")$ $AxialLoadCheck = "Okay"$

$BendingCheck := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$ $BendingCheck = "Okay"$

DEVELOPMENT LENGTH OF PIER REINFORCEMENT

TENSION (ACI 12.2.3)

Factors for development:

Reinforcement Location Factor $\alpha := 1.0$

Coating Factor $\beta := 1.0$

Concrete strength Factor $\lambda := 1.0$

Reinforcement Size Factor $\gamma := 1.0$

Spacing or Cover Dimension: $c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right)$ $c = 3\,in$

Transverse Reinforcement: As allowed by ACI 12.2.4 $k_{tr} := 0$

$$L_{dbt} := \frac{3}{40}\cdot\frac{fy}{\sqrt{f'c\cdot psi}}\cdot\frac{\alpha\cdot\beta\cdot\gamma\cdot\lambda}{\frac{c+k_{tr}}{d_{bpier}}}\cdot d_{bpier} \qquad L_{dbt} = 54.4464\,in$$

Minimum Development Length: (ACI 12.2.1) $L_{dbmin} := 12\cdot in$

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$$L_{dh} := \frac{1200\cdot d_{bpier}}{\sqrt{\frac{f'c}{psi}}}\cdot .7 \qquad L_{dh} = 21.6241\,in$$

$$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right) \qquad L_{db} = 54.4464\,in$$

COMPRESSION: (ACI 12.3.2)

$$L_{dbc1} := \frac{.02\cdot d_{bpier}\cdot fy}{\sqrt{f'c\cdot psi}} \qquad L_{dbc1} = 30.8916\,in$$

$$L_{dbmin} := 0.0003\cdot\frac{in^2}{lb}\cdot\left(d_{bpier}\cdot fy\right) \qquad L_{dbmin} = 25.38\,in$$

$$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) \qquad L_{dbc} = 30.8916\,in$$

Available Length in Pier: $L_{pier} := L_p - 3\cdot in$ $L_{pier} = 87\,in$

$L_{piertension} := if\left(L_{pier} > L_{dbt}, "Okay", "No\ Good"\right)$ $L_{piertension} = "Okay"$

$L_{piercompression} := if\left(L_{pier} > L_{dbc}, "Okay", "No\ Good"\right)$

NOTE: Anchor bolts and plate provided, OK

Available Length in Pad: $L_{pad} := T_f - 3\cdot in$ $L_{pad} = 33\,in$

$L_{padtension} := if\left(L_{pad} > L_{dh}, "Okay", "No\ Good"\right)$ $L_{padtension} = "Okay"$

$L_{padcompression} := if\left(L_{pad} > L_{dbc}, "Okay", "No\ Good"\right)$

TIE SIZE AND SPACING IN COLUMN

Minimum Tie Size:

$Tie_{min} := if(BSpier \le 10, 3, 4)$ $\quad Tie_{min} = 4$

Used #5 Ties $\quad d_{Tie} := 5$

Seismic factor:
(ACI 21.10.5)

$z := if(Z \le 2, 1, 0.5)$ $\quad z = 1$

$s_{lim1} := 16 \cdot d_{bpier} \cdot z$ $\quad s_{lim1} = 22.56\,in$

$s_{lim2} := \frac{48 \cdot d_{Tie} \cdot in}{8} \cdot z$ $\quad s_{lim2} = 30\,in$

$s_{lim3} := D_f z$ $\quad s_{lim3} = 120\,in$

$s_{lim4} := 18in$ $\quad s_{lim4} = 18\,in$

Maximum Spacing:

$$s_{tie} := \min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right) \quad s_{tie} = 18\,in$$

Number of Ties Required:

$$n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 \quad n_{tie} = 5.6667$$

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051
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www.ct.gov/csc

September 1, 2006

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

RE: **EM-VER-003-048-146-049-060803** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify existing telecommunications facilities located at Janoski Road, Ashford; 101 Burbank Road, Ellington; 60 Industrial Park Road, Vernon; and Bright Meadow Road, Enfield, Connecticut.

Dear Attorney Baldwin:

At a public meeting held on August 31, 2006, the Connecticut Siting Council (Council) acknowledged your notice to modify these existing telecommunications facilities, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies.

The proposed modifications are to be implemented as specified here and in your notice dated August 3, 2006, including the placement of all necessary equipment and shelters within the tower compounds. 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 existing facility sites that would not increase tower heights, extend the boundaries of the tower sites, increase noise levels at the tower site boundaries by six decibels, and increase the total radio frequencies electromagnetic radiation power densities measured at the tower site boundaries to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. These facilities have also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on these towers.

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 any of these facilities 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. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

Colin C. Tait

Colin C. Tait
Vice Chairman

CCT/laf

c: See Attached List.

List Attachment.

c: The Honorable Ralph H. Fletcher, First Selectman, Town of Ashford
Richard Dziadus, Zoning Enforcement Officer, Town of Ashford
The Honorable Michael P. Stupinski, First Selectman, Town of Ellington
Matthew Davis, Town Planner, Town of Ellington
The Honorable Patrick L. Tallarita, Mayor, Town of Enfield
Scott A. Shanley, Town Manager, Town of Enfield
Jose Giner, Director of Planning and Community Development, Town of Enfield
The Honorable Ellen L. Marmer, Mayor, Town of Vernon
Gene F. Bolles, Zoning Enforcement Officer, Town of Vernon
Thomas J. Regan, Esq., Brown Rudnick Berlack Israels LLP
Christopher B. Fisher, Esq., Cuddy & Feder LLP
Michele G. Briggs, New Cingular Wireless PCS, LLC
Christine Farrell, T-Mobile
Crossroads Site Management, LLC
Wayne Kemp, New England Site Management, LLP
Thomas F. Flynn III, Nextel Communications, Inc.

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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August 15, 2006

The Honorable Ralph H. Fletcher
First Selectman
Town of Ashford
Knowlton Memorial Town Hall
25 Pompey Hollow Road
P O Box 38
Ashford, CT 06278

RE: **EM-VER-003-048-146-049-060803** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify existing telecommunications facilities located at Janoski Road, Ashford; 101 Burbank Road, Ellington; 60 Industrial Park Road, Vernon; and Bright Meadow Road, Enfield, Connecticut.

Dear Mr. Fletcher:

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

The Council will consider this item at the next meeting scheduled for August 31, 2006 at 1:30 p.m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

If you have any questions or comments regarding this proposal, please call me or inform the council by August 30, 2006.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/ap

Enclosure: Notice of Intent

c: Richard Dziadus, Zoning Enforcement Officer, Town of Ashford

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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August 15, 2006

The Honorable Michael P. Stupinski
First Selectman
Town of Ellington
55 Main Street
P. O. Box 187
Ellington, CT 06029-0187

RE: **EM-VER-003-048-146-049-060803** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify existing telecommunications facilities located at Janoski Road, Ashford; 101 Burbank Road, Ellington; 60 Industrial Park Road, Vernon; and Bright Meadow Road, Enfield, Connecticut.

Dear Mr. Stupinski:

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

The Council will consider this item at the next meeting scheduled for August 31, 2006 at 1:30 p.m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

If you have any questions or comments regarding this proposal, please call me or inform the council by August 30, 2006.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/ap

Enclosure: Notice of Intent

c: Matthew Davis, Town Planner, Town of Ellington

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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August 15, 2006

The Honorable Ellen L. Marmer
Mayor
Town of Vernon
Municipal Building
14 Park Place
Vernon, CT 06066

RE: **EM-VER-003-048-146-049-060803** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify existing telecommunications facilities located at Janoski Road, Ashford; 101 Burbank Road, Ellington; 60 Industrial Park Road, Vernon; and Bright Meadow Road, Enfield, Connecticut.

Dear Mayor Marmer:

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

The Council will consider this item at the next meeting scheduled for August 31, 2006 at 1:30 p.m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

If you have any questions or comments regarding this proposal, please call me or inform the council by August 30, 2006.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/ap

Enclosure: Notice of Intent

c: Gene F. Bolles, Zoning Enforcement Officer, Town of Vernon

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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www.ct.gov/csc

August 15, 2006

The Honorable Patrick L. Tallarita
Mayor
Town of Enfield
820 Enfield Street
Enfield, CT 06082

RE: **EM-VER-003-048-146-049-060803** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify existing telecommunications facilities located at Janoski Road, Ashford; 101 Burbank Road, Ellington; 60 Industrial Park Road, Vernon; and Bright Meadow Road, Enfield, Connecticut.

Dear Mayor Tallarita:

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

The Council will consider this item at the next meeting scheduled for August 31, 2006 at 1:30 p.m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

If you have any questions or comments regarding this proposal, please call me or inform the council by August 30, 2006.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/ap

Enclosure: Notice of Intent

c: Jose Giner, Director of Planning and Community Development, Town of Enfield
Scott A. Shanley, Town Manager, Town of Enfield